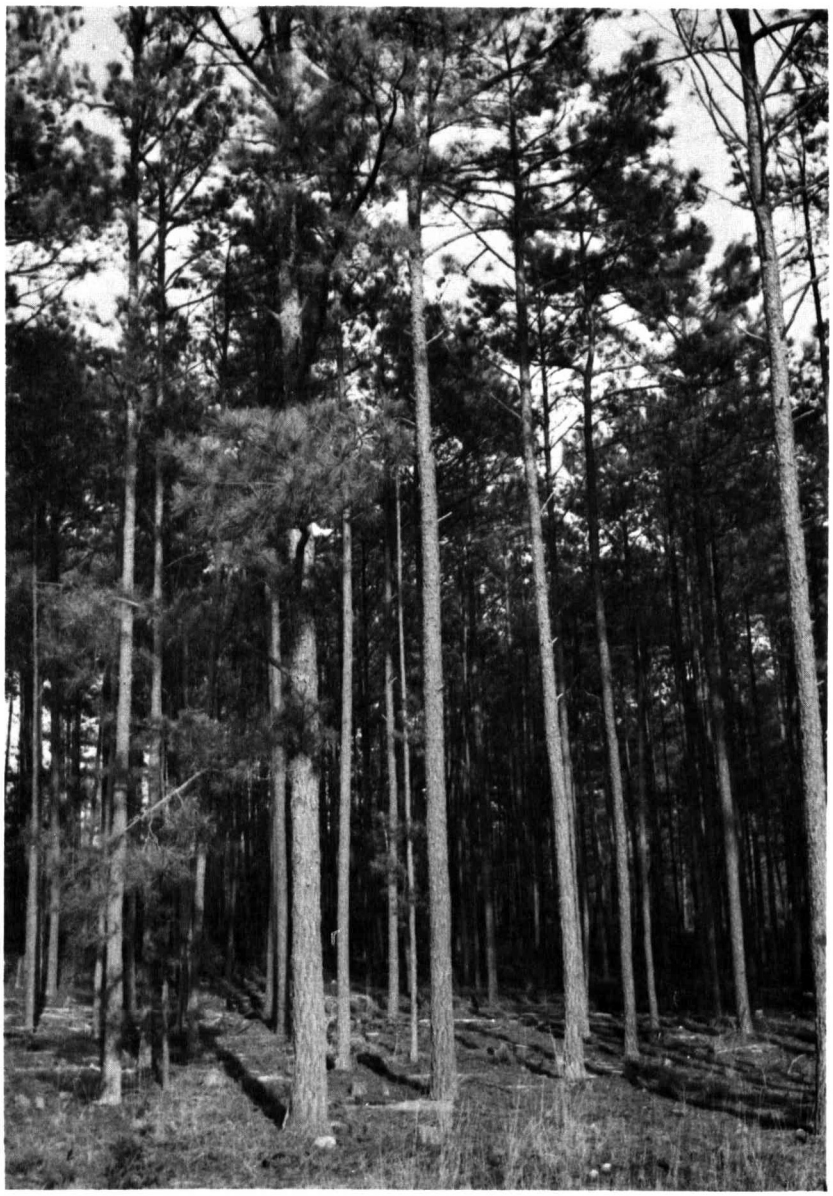
SOIL SURVEY



Howard County, Arkansas

United States Department of Agriculture
Soil Conservation Service
and
Forest Service
In cooperation with
Arkansas Agricultural Experiment Station

Major fieldwork for this soil survey was done in the period 1964–68. Soil names and descriptions were approved in 1970. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1968. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the Arkansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Mine Creek Soil and Water Conservation District.

Copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, and other structures, and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Howard County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the woodland group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the range sites and woodland groups.

Foresters and others can refer to the section "Use of the Soils for Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Ranchers and others can find, under "Use of the Soils for Range," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and recreation areas in the section "Use of the Soils for Town and Country Planning."

Engineers and builders can find, under "Use of the Soils in Engineering," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Howard County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given at the beginning of the publication.

Cover: Even-aged stand of second-growth shortleaf pine on Sherwood fine sandy loam, 3 to 8 percent slopes.

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Issued October 1975

SOIL SURVEY OF HOWARD COUNTY, ARKANSAS

BY JAMES E. HOELSCHER, CHARLIE N. McCOLLUM, AND GLEN D. LAURENT, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE AND FOREST SERVICE, IN COOPERATION WITH THE ARKANSAS AGRICULTURAL EXPERIMENT STATION

HOWARD COUNTY is in southwestern Arkansas (fig.1). The Saline River, from Millwood Reservoir north to Dierks Reservoir, forms the county's western boundary with Sevier County. The county is irregular in shape. It ranges from about 18 miles in width at the northern boundary to about 8 miles in width at the southern boundary. Its maximum length is about 42 miles. According to United States Census reports, the approximate area is 384,000 acres, or 600 square miles.

In 1970, the population of the county was 11,412. Nashville, the county seat, is the largest town in the county and has a population of 4,016.

General Nature of the County

The early economy of Howard County was based on logging and general farming. The main cash crops were fruit, cotton, corn, and livestock. In the 1930's, reforestation began and now about 72 percent of the county is in woodland that is managed for the production of pulpwood, poles, and sawlogs. Most of the remaining land is used for pasture and forage crops, and a small acreage is used for peach orchards, winter small grain, cotton, and soybeans. In 1969, about 31 percent of the county was in farms.

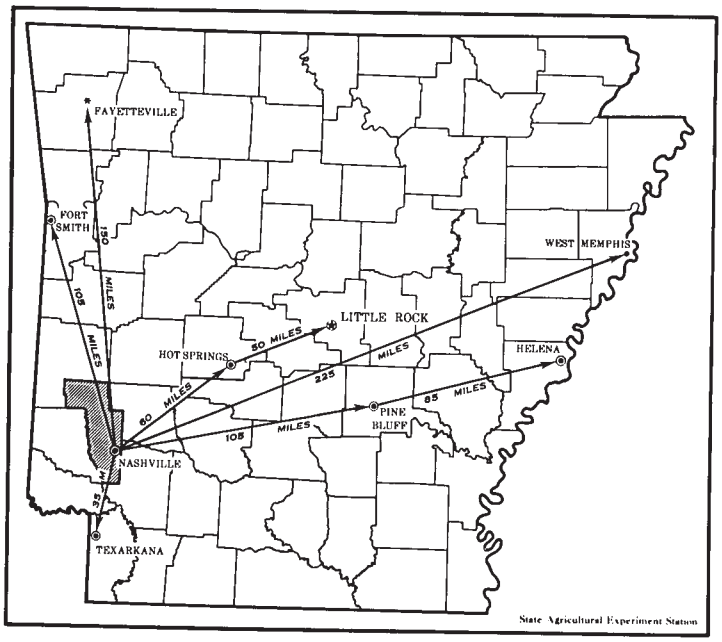

Figure 1.—Location of Howard County in Arkansas.

According to the 1969 Census of Agriculture, 658 acres of oats was grown for grain; 50,068 acres was in pasture but this acreage included only cropland pastured and improved pasture, and 175,555 peach trees were growing in 1964. The acreage of other principal crops in 1964 and 1969 was as follows:

Crop:	*1964*	*1969*
Cotton	791	193
Cotton	846	1,437
Soybeans (for beans)	158	1,945
Hay	7,299	9,433

According to the Census of Agriculture, 187,019 turkeys were raised in the county in 1964. The number of other livestock and poultry raised in 1964 and 1969 was, as follows:

	Number in 1964	*Number in 1969*
Livestock and poultry raised:		
All cattle and calves	22,761	25,142
Milk cows	492	315
Hogs and pigs	1,115	560
Chickens 3 months old and older-	122,605	406,793
Poultry sold:		
Hens and roosters	103,855	767,250
Broilers	13,687,500	23,092,034

Nitrogen is the most needed fertilizer for locally grown crops, but a complete fertilizer is needed for most crops. In 1964, there were 1,842 tons of fertilizer applied on 12,105 acres on 323 farms and 3,310 tons of lime applied on 1,716 acres on 39 farms.

Most farm products are processed outside of the county. The principal industrial enterprises related to farming are lumber mills, poultry-feed mills, broiler hatcheries, and poultry-processing plants.

Between 1964 and 1969, the number of farms decreased from 853 to 648, and the acreage in farms decreased from 130,925 to 114,405. The average farm increased in size from about 154 to 176 acres.

In 1969, 516 farm operators were full owners, 100 were part owners, and 32 were tenants. Of these operators, 379 held part-time jobs off the farm, and 310

of them worked off the farm 100 days or more. Nearly all the farms are small enough that the operator's family, with occasional outside help in peak seasons, can do the work.

Most farms are mechanized to some extent, but equipment for clean-tilled crops decreased greatly between 1964 and 1969. Most equipment is used for livestock and poultry farming.

Physiography and Drainage

Howard County includes parts of three land resource areas. These are the Ouachita Mountains in the north, the Southern Coastal Plain, and the Blackland Prairies. The soils formed in material weathered from folded and fractured sandstone and shale, from unconsolidated alluvial sediment, and from chalk or marl. Except for most soils in the Blackland Prairies, the soils are predominantly low in plant-nutrient content.

The Ouachita Mountains trend west to east in long, narrow, rolling to steep ridges. Intermittent drainageways mainly follow the narrow valleys. Most of them drain into either the Cossatot River or the Saline River. Both of these rivers flow south through watergaps in the mountain ridges. In Howard County, the Cossatot River is entirely within the mountains, and Gillham Reservoir is under construction near where the river leaves the county. The Saline River flows the entire length of the county, and forms most of its western boundary. Dierks Reservoir is under construction on the Saline River, at about the same latitude as the Gillham Reservoir. Millwood Reservoir inundates the Saline River flood plain in the southwestern part of the county.

Tributaries flow westerly to the Saline River and carry runoff from the level to gently rolling Coastal Plains and Blackland areas. Some of the main tributaries are Mine Creek, Holly Creek, Messer Creek, and Blue Bayou.

In the northeastern part of the county, a small area drains east through mainly intermittent streams into Muddy Fork Creek, then into the Little Missouri River.

The conservation pool of Millwood Reservoir, at 257 feet above sea level, is the lowest elevation in the county. It is in the southwestern corner of the county. The highest elevation is in the northeastern part of the county, about 1,700 feet above sea level, on Big Tom Mountain.

The supply of surface water in the county is good. The principal streams, Cossatot River, Saline River, and Mine Creek, flow all year. Millwood Reservoir retains many thousands of acre-feet of water in its conservation pool. When they are completed, Gillham and Dierks Reservoirs will add significantly to the water supply, help control flooding, and maintain a more uniform flow in the Cossatot and Saline Rivers. Small, private reservoirs have been built in most parts of the county. Most farms have ponds for livestock and recreation that range from one-fourth acre to 15 acres in size.

The supply of ground water generally is good. Wells in most parts of the county yield adequate water for household use.

Climate [1]

Howard County has long, hot, humid summers, and mild winters. Precipitation generally is ample and is well distributed throughout the year. Table 1 shows data on precipitation and temperatures from the U.S. Weather Bureau station at Nashville.

Summer is characterized by bright sunshine, high temperatures, and high humidity, interrupted by short periods of scattered showers and thunderstorms, mainly in the afternoon or evening. On at least 6 days in summer, temperatures of 100°F. or higher can be expected. In the fall, days are warm and the nights are cool. This is normally the driest, most pleasant season.

The Gulf of Mexico provides a year round source of moisture in the form of humidity, summer showers, and moderate to heavy winter rains. The county is sufficiently far north to be within the track of winter storms, and polar and arctic air outbreaks are not uncommon. The general area that includes Howard County is frequently the borderline between tropical Gulf and continental weather systems.

The topography of Howard County has a noticeable effect on precipitation. The Ouachita Mountains in the northern part of the county are high enough to cause significant precipitation. When it reaches the higher elevations, the moist southerly flow of air can release as much as 6 inches more rainfall than is released over the lower, southern part of the county.

Winter temperatures are mild. Subzero temperatures are rare and of very brief duration. On only about half of the winter nights are temperatures below freezing. Daytime temperatures are mild, in the 50° to 60° range. Warm periods when temperatures are 70° or higher are common. Below freezing periods are brief. Temperatures of 16° or lower normally occur only between December 18 and January 28, but have been recorded as early as November 18 and as late as March 27. Temperature changes accompanying fronts in winter and early in spring are often pronounced. Temperatures frequently fall sharply as a winter cold front passes, but severe cold waves are rare. The passing of a warm front in winter and spring can produce sudden warming.

The growing season is long. At least 7 months of the year are frost free. Over most of the county, the average date of the last 32° temperature in spring is April 1 and the first in fall is November 5. The latest recorded 32° temperature in spring is April 20, and the earliest in fall is October 17. The latest recorded 28° temperature in spring is March 31, and the earliest in fall is October 27. The average date of the last 28° temperature in spring, a more significant threshold temperature for farming, is March 15; the earliest is November 16. The span between the average and extreme dates is probably less at the higher elevations in the north part of the county, but no reliable, long-term records are available for these years.

Precipitation generally is ample for farming. It averages about 54 inches a year. Spring is the wettest

[1] By Robert O. Reinhold, meteorologist for Arkansas, National Weather Service, U.S. Department of Commerce, Little Rock.

season, about one-third of the annual precipitation falls in the 3-month period March through May. Precipitation generally is well distributed throughout the year. General rains in winter and early in spring are more reliable than summer showers, which are erratic in distribution and can be locally intense.

Snowfall is negligible. The annual snowfall averages less than 3 inches and usually either melts within a few hours or as it falls, except at the higher elevations in the northern part of the county. There is about a 50 percent chance that in a given year there will be only a trace of snow or none. Sleet or freezing rain and drizzle occur only occasionally, but freezing rain has caused severe damage to timber stands, particularly to pine trees.

Thunderstorms are fairly common; the average number of thunderstorm-days is 60 a year. These storms ordinarily are not accompanied by damaging winds. Tornadoes are infrequent. One or two tornadoes may be expected to occur in the county in any given 10-year period.

Short periods of drought are fairly frequent late in summer and in the fall. There is, however, less than a 10 percent chance that rainfall will total less than 1 inch in a given 30-day period.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Howard County, where they are located, and how they can be used. The soil scientists went into the county knowing they were likely to find many soils they had already seen and perhaps some they had not. As they traveled over the county, they observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Blevins and Sacul, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Some soils that are significantly different from all defined series, but that have a known extent of less than 2,000 acres, are named soil variants. They are given the name of the soil series they are most like, for example, Marietta silt loam, silty subsoil variant.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the

TABLE 1.—*Temperature and precipitation data*

[All data from Nashville, for the period 1940 through 1968]

Month	Temperature				Precipitation		
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average total	One year in 10 will have—	
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—
	°F	°F	°F	°F	*Inches*	*Inches*	*Inches*
January	52.8	30.5	76	7	3.81	1.11	6.21
February	56.9	33.3	78	12	4.18	1.32	7.58
March	64.2	39.5	84	17	5.00	1.99	7.93
April	74.2	50.1	87	30	6.36	2.68	9.72
May	81.1	58.3	92	41	6.69	2.78	10.91
June	88.4	66.1	98	52	4.45	.55	9.28
July	92.4	69.0	103	60	3.87	1.57	6.59
August	92.6	68.1	104	57	3.73	.93	5.72
September	86.2	62.0	100	45	4.16	1.22	7.03
October	77.6	50.9	91	32	3.72	.49	8.44
November	64.6	39.4	83	18	4.09	1.54	6.87
December	55.2	32.6	78	11	3.97	1.46	6.55
Year	73.9	50.0			54.03		

basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Sacul fine sandy loam, 3 to 8 percent slopes, is one of several phases within the Sacul series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Howard County: soil associations and undifferentiated groups.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map but are shown as one unit because the time and effort of delineating them separately cannot be justified. There is a degree of uniformity in the pattern and relative extent of the dominant soils, but the soils may differ greatly one from another. The name of an association consists of the names of the dominant soils, joined by a hyphen. Pirum-Pickens association, undulating, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. Pickens soils, 3 to 12 percent slopes, is an undifferentiated soil group in this county.

In most areas surveyed, there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Rock land is a land type in Howard County.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or a high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Howard County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The five soil associations in Howard County are discussed in the following pages. The terms for texture used in the descriptive heading of all the associations apply to the texture of the surface layer. For example, in the title of association 1, the word, loamy, refers to the texture of the surface layer.

1. Sherwood-Pickens association

Moderately deep and shallow, well drained and somewhat excessively drained, loamy, acid soils on low mountains

This association consists of the Ouachita Mountains area in the northern part of the county. Many areas of the association are gravelly, shaly, or stony. This association is characterized by narrow winding ridge-

tops, rolling to steep wooded mountainsides, and narrow stream valleys. The valleys are long and winding. They range from little wider than the stream to as much as one-half mile wide and are about 450 to 800 feet above sea level. The mountainsides rise from the valleys by generally smooth, uniform slopes. Slopes generally are 12 to 40 percent. Most ridgetops are less than one-fourth mile wide. They are long and winding, and the slopes are mainly 3 to 12 percent. Most ridgetops range from 750 to 1,000 feet above sea level, but a few are nearly 1,700 feet high. Sherwood soils are mainly on the ridgetops, and Pickens soils are mainly on the side slopes.

This association makes up about 44 percent of the county. Sherwood soils make up about 44 percent of the association, and Pickens soils 25 percent. The remaining 31 percent is Rock land and very shallow, unnamed soils, Pirum and Toine soils, poorly drained spots in the stream valleys, and a few water areas.

Sherwood soils are well drained. Their surface layer is brown and yellowish-brown fine sandy loam that is gravelly or stony in places. The subsoil is yellowish-red sandy clay loam that is gravelly or stony in places. The underlying material, beginning at a depth of 21 to 48 inches, is tilted and fractured, interbedded sandstone and shale.

Pickens soils are somewhat excessively drained. They are 10 to 20 inches thick over tilted and fractured sandstone or shale bedrock, and most areas are shaly or stony throughout the profile. Their surface layer is dark grayish-brown fine sandy loam or silt loam. The subsoil is yellowish-brown fine sandy loam or silt loam.

About 90 to 95 percent of this association is wooded. A few hundred acres of the Ouachita National Forest are in the northeastern part of this association. Much of the acreage is held in extensive tracts for commercial wood crop production. Nearly all of the cleared acreage is in small, scattered fields on the wider parts of the ridgetops and in the stream valleys. The cleared areas are fields on small farms that range from 40 to 200 acres in size. Many of the farms produce broiler chickens as their main enterprise. The cleared areas are used to produce forage for beef cattle. Many farmers work part time off the farm.

Except for the wider parts of the ridgetops and the parts of the stream valleys that are above the level of frequent overflow, this association is not suited to farming. The erosion hazard ranges from severe to very severe. Coarse fragments make many parts of the area difficult to till. The soils are shallow or only moderately deep. They have low to moderate available water capacity and low natural fertility.

This association is better suited to woodland than to most other uses. Yields of wood crops are fairly high. This association is generally well suited to such forest-related outdoor recreation as hunting, camping, picnicking, and hiking. Stoniness and steepness limit the use of equipment, and erosion is a very severe hazard along access roads unless they are carefully constructed.

This association has severe limitations for intensive nonfarm development. It is remote from large population centers. The slopes and the underlying bedrock are moderate to severe limitations to the construction of highways or large buildings. There are suitable residential building sites in parts of the association, but accessibility is a problem and the limitations to use for septic tank drainage fields are severe.

2. *Saffell-Sacul association*

Deep, well drained and moderately well drained, nearly level to moderately steep, loamy, acid soils on rolling Coastal Plain uplands

This association consists of rolling, strongly dissected uplands and narrow, winding flood plains of intermittent streams in the north-central part of the county. Slopes range from 1 to 20 percent in most places, but are dominantly less than 1 percent on the narrow flood plains. The soils are intermingled on the landscape, but Saffell soils are mainly on the higher parts, and Sacul soils are on the sides of ridges and hillocks.

This association makes up about 19 percent of the county. Saffell soils make up about 50 percent of the association, Sacul soils 25 percent, and other soils, mainly Angie, Blevins, Luverne, Millwood, Ozan, Toine, and Tiak soils, the remaining 25 percent.

Saffell soils are well drained. Their surface layer is dark grayish-brown gravelly sandy loam. The upper part of the subsoil is yellowish-red and red gravelly sandy clay loam, and the lower part is strong-brown gravelly sandy loam. The underlying material is yellowish-brown gravelly sandy loam.

Sacul soils are moderately well drained. Their surface layer is yellowish-brown fine sandy loam. The subsurface layer is light yellowish-brown silt loam. The upper part of the subsoil is red silty clay, the middle part is red, mottled clay loam, and the lower part is light-gray, mottled loam. The underlying material is light-gray, mottled, soft shale of silt loam texture.

About 75 percent of this association is wooded. Nearly all of the cleared acreage is in nearly level and gently sloping areas on low ridgetops and in narrow strips along streams. Most cleared areas are small fields on farms that range from 80 to 200 acres in size. Many of the farms produce broiler chickens. The cleared areas are used mainly to produce forage for beef cattle, but some are used for peach orchards.

This association is well suited to wood crops and to recreational activities. It is also suited to farming, but the erosion hazard ranges from moderate to very severe. The soils have low to high available water capacity, and their natural fertility is low. The Saffell soils have a high gravel content. They are somewhat difficult to till and are more droughty than other soils in the association.

Limitations for intensive nonfarm development range from slight to severe for the Saffell soils, depending mainly on slope. Limitations are moderate to severe for the Sacul soils. The clayey subsoil of the Sacul soils has low bearing strength for highways and foundations, and it severely restricts drainage from septic tanks. There are suitable building sites in the Saffell parts of the association. Most areas of surface

mining for gravel in the county are in the Saffell parts of this association.

3. *Blevins-Sacul-Ruston association*

Deep, well drained and moderately well drained, nearly level to moderately sloping, loamy, acid soils on rolling Coastal Plain uplands

This association consists of rolling, strongly dissected uplands, stream terraces, and narrow, winding flood plains along streams in the central and southern parts of the county. Slopes range from 1 to 12 percent in most places but are dominantly less than 1 percent on the narrow flood plains. Blevins and Ruston soils are mainly on the highest parts of the landscape, and Sacul soils are on the sides of ridges and hillocks.

This association makes up about 21 percent of the county. Blevins soils make up about 20 percent of the association, Sacul soils 20 percent, Ruston soils 15 percent, and other soils, mainly Angie, Cane, Luverne, Ozan, Saffell, Savannah, Toine, and Tiak soils, the remaining 45 percent.

Blevins soils are well drained. Their surface layer is yellowish-brown loam. The subsurface layer is light yellowish-brown silt loam. The upper part of the subsoil is yellowish-brown loam, and the lower part is yellowish-brown, mottled silt loam and loam.

Sacul soils are moderately well drained. Their surface layer is yellowish-brown fine sandy loam. The subsurface layer is light yellowish-brown silt loam. The upper part of the subsoil is red silty clay, the middle part is red, mottled clay loam, and the lower part is light-gray, mottled loam. The underlying material is light-gray, mottled, soft shale of silt loam texture.

Ruston soils are well drained. Their surface layer is brown fine sandy loam. The upper part of the subsoil is yellowish-red loam, and the lower part is yellowish-red fine sandy loam.

Between 80 and 90 percent of the association is wooded. Nearly all of the cleared acreage is in nearly level and gently sloping areas. Most cleared areas are scattered small fields on farms that range from 40 to 160 acres in size. Many of the farms produce broiler chickens. The cleared areas are used mainly to produce forage for beef cattle. Many of the farmers work part time off the farm.

This association is well suited to woodland, and yields of wood crops are fairly high. This association is well suited to such recreational activities as hunting, camping, picnicking, and hiking. It is fairly well suited to farming, but the erosion hazard ranges from moderate to very severe. The soils have moderate to high available water capacity, and their natural fertility is low.

Limitations for intensive nonfarm development range generally from slight to moderate for the Blevins and Ruston soils and from moderate to severe for the Sacul soils. The clayey subsoil of the Sacul soils has low bearing strength for highways and foundations, and it severely restricts drainage from septic tanks. There are many suitable building sites in the Blevins and Ruston parts of the association.

4. *Ozan-Adaton-Toine association*

Deep, poorly drained and well drained, level, loamy, acid soils on bottom lands and low stream terraces in the Coastal Plain

This association consists of level flood plains and low stream terraces in the western part of the county, along the Saline River and its larger tributaries. It includes the part of Millwood Reservoir that lies in Howard County. This association is subject to occasional or frequent flooding of short duration, mainly in winter and in spring. Slopes are dominantly less than 1 percent.

This association makes up about 6 percent of the county. Ozan soils make up about 45 percent of the association, Adaton soils 15 percent, Toine soils 15 percent, and other soils, mainly Blevins and Ruston soils, and water areas the remaining 25 percent.

Ozan soils are poorly drained. Their surface layer is light brownish-gray fine sandy loam. The subsurface layer is light-gray, mottled fine sandy loam that tongues into the subsoil. The subsoil is light-gray, mottled loam.

Adaton soils are poorly drained. Their surface layer is dark grayish-brown silt loam. The upper part of the subsoil is light-gray, mottled silty clay loam, and the lower part is gray and red, mottled silty clay.

Toine soils are well drained. Their surface layer is brown loam and fine sandy loam. The upper part of the subsoil is dark yellowish-brown sandy clay loam that is mottled below a depth of about 31 inches, and the lower part is dark yellowish-brown and gray, mottled fine sandy loam.

About 60 percent of this association is wooded. Most cleared areas are scattered fields on farms that range from 80 to 320 acres in size. Nearly all of the cleared areas are used to produce forage for beef cattle. Because of soil wetness and the flood hazard, the farmers live in towns or communities or on upland parts of their farms.

This association is well suited to woodland, and yields of wood crops are high. Most areas are well suited to pasture and hay crops, but the flood hazard is a moderate to severe limitation for most tilled crops. The soils have moderate to high available water capacity, and their natural fertility is low.

Limitations for intensive nonfarm development in this association are generally severe because of soil wetness and the hazard of flooding. Areas of Toine soils that are only occasionally flooded have moderate limitations for highway location and recreational developments.

5. *Oktibbeha-Sumter-Leeper association*

Deep and moderately deep, well drained to somewhat poorly drained, nearly level to moderately steep, clayey, acid and alkaline soils on uplands and flood plains in the blacklands

This association consists of blacklands areas in the southern part and in a narrow strip across the central part of the county. The soils are on gently rolling uplands and narrow, winding stream flood plains. Much of the upland part of the association is eroded or

severely eroded. Slopes range from 3 to 20 percent. Slopes are dominantly less than 1 percent on the flood plains, which are subject to occasional or frequent flooding.

This association makes up about 10 percent of the county. Oktibbeha soils make up about 23 percent of the association, Sumter soils 20 percent, Leeper soils 15 percent, and other soils, mainly Demopolis, Kaufman, Marietta, Muskogee, and Terouge soils, the remaining 42 percent.

Oktibbeha soils are moderately well drained. Their surface layer is brown clay. The upper part of the subsoil is yellowish-red clay, the middle part is yellowish-red and gray, mottled clay, and the lower part is brownish-yellow and yellowish-brown, mottled clay. The underlying material is gray, mottled clay, overlying chalk.

Sumter soils are well drained. Their surface layer is olive clay. The upper part of the subsoil is pale-olive clay, and the lower part is gray, mottled silty clay. The underlying material is chalk.

Leeper soils are somewhat poorly drained. Their surface layer is dark grayish-brown silty clay. The subsoil is dark-gray, mottled clay. The underlying material is clay mottled with dark gray and light olive brown.

The part of the association that is in the central part of the county is wooded, except for a few small prairies and strip-mined areas. The part in the southern part of the county is only 15 to 20 percent wooded. Some areas are strip mined. On uplands, the open land is used for native grass range or improved pasture, and on the flood plains, it is used for improved pasture, hay, soybeans, and cotton. Most of the farms range from 80 to 400 acres in size. Most farms are used to produce beef cattle and broiler chickens. Many of the farmers work part time off the farm.

This association is better suited to producing forage for livestock than most other uses. Oktibbeha and Leeper soils are suited to woodland, and yields of wood crops are fair to good, but Sumter soils are poorly suited. The association is fairly well suited to extensive types of farming, but requires careful management. The soils have moderate to high available water capacity and their natural fertility is moderate to high. The hazard of erosion in upland areas is severe to very severe. The flood plains are subject to occasional to frequent flooding.

Limitations for nonfarm uses are severe on the soils of this association. These soils shrink and crack as they dry, and they expand and the cracks seal when wet. The clayey surface layer makes this association poorly suited to recreational use. The high shrink-swell potential and low bearing strength, as well as flooding on the Leeper soils, are severe limitations to the construction of foundations and highways, and slow percolation is a severe limitation for septic tank drainage fields.

Of several strip mines in the area, those in the central part of the county produce gypsum and those in the southern part produce chalk for local processing into portland cement.

Descriptions of the Soils

This section describes the soil series and mapping units in Howard County. Each soil series is described in detail, and then, briefly, each mapping unit in that series. The description of each mapping unit contains suggestions about use and management of the soil. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or they are differences that are apparent in the name of the mapping unit. Color terms are for moist soil unless otherwise stated.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Rock land, for example, does not belong to a soil series but, nevertheless, is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit and woodland group in which the mapping unit has been placed.

The acreage and proportionate extent of each mapping unit are shown in table 2. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual *(9)*.[2]

Adaton Series

The Adaton series consists of deep, level, poorly drained soils of the Gulf Coastal Plain. These soils are mainly in broad flat areas on uplands, but some are on low terraces along streams. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is dark grayish-brown silt loam about 6 inches thick. The upper part of the subsoil is light-gray, mottled silty clay loam that extends to a depth of about 60 inches. The lower part is gray and red, mottled silty clay.

Adaton soils are low in natural fertility. The available water capacity is high, and permeability is slow. The root zone is deep.

[2] Italic numbers in parentheses refer to Literature Cited. p. 73.

TABLE 2.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Adaton silt loam	4,132	1.1
Angie silt loam, 1 to 3 percent slopes	5,788	1.5
Angie silt loam, 3 to 8 percent slopes	3,634	.9
Blevins loam, 1 to 3 percent slopes	10,076	2.6
Blevins loam, 3 to 8 percent slopes	11,230	2.9
Cane fine sandy loam, 3 to 8 percent slopes	2,150	.6
Demopolis silty clay, 3 to 12 percent slopes, severely eroded	3,781	1.0
Greenville loam, 3 to 8 percent slopes	788	.2
Kaufman clay	1,722	.4
Leeper silty clay	5,633	1.5
Luverne fine sandy loam, 8 to 20 percent slopes	9,036	2.4
Marietta silt loam, silty subsoil variant	1,727	.4
Millwood fine sandy loam, 3 to 8 percent slopes	4,549	1.2
Millwood fine sandy loam, 8 to 12 percent slopes	1,279	.3
Muskogee silt loam, 1 to 3 percent slopes	1,848	.5
Oktibbeha clay, 3 to 8 percent slopes, eroded	4,807	1.3
Oktibbeha clay, 8 to 12 percent slopes, eroded	1,607	.4
Ozan fine sandy loam	17,310	4.5
Pickens soils, 3 to 12 percent slopes	3,780	1.0
Pickens-Sherwood-Rock land association, hilly	37,454	9.8
Pirum fine sandy loam, 3 to 8 percent slopes	1,176	.3
Pirum-Pickens association, undulating	10,253	2.7
Pirum-Sherwood association, undulating	12,797	3.3
Ruston fine sandy loam, 1 to 3 percent slopes	9,168	2.4
Ruston fine sandy loam, 3 to 8 percent slopes	4,626	1.2
Sacul fine sandy loam, 1 to 3 percent slopes	1,166	.3
Sacul fine sandy loam, 3 to 8 percent slopes	17,196	4.5
Sacul fine sandy loam, 8 to 12 percent slopes	20,451	5.3
Saffell gravelly loam, 1 to 3 percent slopes	3,192	.8
Saffell gravelly sandy loam, 3 to 8 percent slopes	19,769	5.1
Saffell gravelly sandy loam, 8 to 20 percent slopes	14,748	3.9
Savannah fine sandy loam, 1 to 3 percent slopes	2,331	.6
Savannah fine sandy loam, 3 to 8 percent slopes	3,556	.9
Sherwood fine sandy loam, 3 to 8 percent slopes	6,089	1.6
Sherwood fine sandy loam, 8 to 12 percent slopes	4,616	1.2
Sherwood-Pickens association, rolling	90,918	23.7
Sumter clay, 3 to 12 percent slopes, eroded	5,329	1.4
Sumter-Oktibbeha association, rolling	5,695	1.5
Terouge clay, 0 to 1 percent slopes	2,451	.6
Terouge clay, 1 to 3 percent slopes	2,346	.6
Tiak soils, 8 to 20 percent slopes	3,469	.9
Toine loam	7,166	1.9
Water	3,171	.8
Total	384,000	100.0

Most tracts are wooded. If these soils are drained and well managed, they are suited to most crops grown in the county. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Adaton silt loam, in a moist wooded area, in the SW¼NE¼SW¼ sec. 2, T. 11 S., R. 28 W.:

O1—1½ inches to ½ inch, pine needles and oak leaves.
O2—½ inch to 0, partly decomposed forest debris.
A1—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, faint, gray mottles and few, fine, distinct, yellowish-brown mottles; weak, medium, granular structure; friable; many large and medium roots; few wormholes; few fine pores; strongly acid; clear, smooth boundary.
B21tg—6 to 10 inches, light-gray (10YR 7/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; many large and medium roots; few fine pores; very strongly acid; gradual, smooth boundary.
B22tg—10 to 24 inches, light-gray (10YR 7/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; many medium roots; few fine pores; very strongly acid; gradual, smooth boundary.
B23tg—24 to 41 inches, light-gray (10YR 7/1) silty clay loam; common, fine, distinct, brownish-yellow mottles and few, fine, prominent, yellowish-red mottles; moderate, medium, subangular blocky structure; firm; few, thin, patchy clay films on faces of peds; many fine roots; few fine pores; very strongly acid; gradual, wavy boundary.
B24tg—41 to 60 inches, light-gray (10YR 6/1) silty clay loam; common, fine, distinct, yellowish-brown mottles and few, fine, prominent, yellowish-red mottles; moderate, medium, subangular blocky structure; firm; thin continuous clay films on faces of peds; few fine roots; few fine pores; very strongly acid; gradual, wavy boundary.
B3g—60 to 72 inches, gray (10YR 6/1) and red (2.5YR 4/6) mottled silty clay; weak, medium, angular blocky structure; few fine pores; very strongly acid.

The A1 horizon is dark grayish brown, grayish brown, or gray. The B2tg horizon is light gray or light brownish gray. The B3g horizon is silty clay or silty clay loam. The A horizon is medium acid to very strongly acid, and the B horizon is strongly acid to extremely acid.

These soils contain slightly more sand than is defined in the range for the series, but this difference does not alter their usefulness and behavior.

Adaton soils are associated with Ozan, Angie, Blevins, Sacul, and Toine soils. They are more poorly drained than any of the associated soils, except Ozan soils. They are grayer than Angie and Blevins soils. They are grayer and less clayey in the upper part of the B horizon than Sacul soils. They are grayer and contain less sand than Toine soils, and they contain more silt than Ozan soils.

Adaton silt loam (Ad).—This soil is level and poorly drained. It is on upland flats and stream terraces. The areas are 20 to 100 acres in size. Included with this soil in mapping are spots of Ozan and Blevins soils and a few small areas that have rounded mounds 50 to 100 feet in diameter and 3 to 5 feet high.

This soil is suitable for farming, but excess water is a severe hazard and some areas are subject to occasional flooding. Under good management that includes adequate drainage, crops that leave large amounts of residue can be grown year after year.

Because of wetness and low fertility, only a small acreage is used for crops and pasture. Suitable crops are grain sorghum, soybeans, and winter small grains. Better suited than most other pasture plants are bermudagrass, Pensacola bahiagrass, tall fescue, white clover, and annual lespedeza. Nearly all of the acreage is woodland, and the soil is well suited to this use. Capability unit IIIw–1; woodland group 2w9a.

Angie Series

The Angie series consists of deep, nearly level to gently sloping, moderately well drained soils on uplands. These soils formed in sediments of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is brown silt loam about 7 inches thick. The subsoil extends to a depth of 72 inches or more. The upper 9 inches is yellowish-brown silty clay loam; the next 8 inches is

yellowish-brown, mottled silty clay; the next 32 inches is gray, mottled silty clay; and beneath this is 16 inches of gray, mottled clay.

Angie soils are low in natural fertility. The available water capacity is high, and permeability is slow. The root zone is deep, but roots penetrate slowly into the lower part of the subsoil.

If these soils are well managed, they are fairly well suited to most crops and pasture plants grown in the county. Most of the acreage is wooded. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Angie silt loam, 1 to 3 percent slopes, in a moist wooded area in the NE¼SE¼SE¼ sec. 27, T. 10 S., R. 28 W.:

O1—1½ inches to ½ inch, pine needles and oak leaves.
O2—½ inch to 0, partly decomposed forest debris.
A1—0 to 7 inches, brown (10YR 5/3) silt loam; common, medium, faint, dark grayish-brown (10YR 4/2) mottles; moderate, medium, granular structure; very friable; many medium and fine roots; few wormholes; many fine pores; medium acid; clear, smooth boundary.
B1—7 to 16 inches, yellowish-brown (10YR 5/6) silty clay loam; weak, medium, subangular blocky structure; friable; few medium and many fine roots; few worm holes; few fine pores; very strongly acid; gradual, wavy boundary.
B21t—16 to 24 inches, yellowish-brown (10YR 5/6) silty clay; common, medium, distinct, gray (10YR 6/1) mottles and common, medium, prominent, yellowish-red (5YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; common, thin, patchy clay films on faces of peds and in pores and root channels; few fine roots; few fine pores; extremely acid; gradual, wavy boundary.
B22tg—24 to 42 inches, gray (10YR 6/1) silty clay; common, medium, prominent, red (2.5YR 4/8) mottles and common, medium, distinct, brownish-yellow (10YR 6/6) mottles; moderate, medium, subangular blocky structure; very firm, plastic; thick patchy clay films on faces of peds; light-gray (10YR 7/1) patchy silt coatings on vertical faces of most peds; few fine roots; few fine pores; extremely acid; gradual, smooth boundary.
B23tg—42 to 56 inches, gray (10YR 6/1) silty clay; common, medium, prominent, red (2.5YR 4/8) mottles and few, fine, distinct, brownish-yellow mottles; moderate, medium, subangular blocky structure; very firm, plastic; thick patchy clay films on faces of peds; light-gray (10YR 7/1) patchy silt coatings on vertical faces of some peds; extremely acid; gradual, smooth boundary.
B24tg—56 to 72 inches, gray (10YR 6/1) clay; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles and common, fine, prominent, red mottles; moderate, medium, angular blocky structure; very firm, plastic; thin patchy clay films on faces of peds; few fine pores; extremely acid.

The A1 or Ap horizon is very dark grayish brown to brown. The B1 horizon is silty clay loam or silt loam. The B21t horizon is yellowish brown or strong brown. The B2t horizon is silty clay or clay. Reaction is medium acid or strongly acid in the A horizon and is strongly acid to extremely acid in the B horizon.

Angie soils are associated with Blevins, Millwood, Sacul, and Tiak soils. They have a more clayey B horizon than Blevins soils. They are not so red in the B horizon as Millwood, Sacul, and Tiak soils.

Angie silt loam, 1 to 3 percent slopes (AnB).—This soil is in areas of 10 to 200 acres. It has the profile described as representative of the series. Included with it in mapping are a few small areas of Millwood, Sacul, and Tiak soils and a few areas that have a silty clay loam surface layer over a mottled red and gray clay subsoil.

Runoff from this soil is medium, and erosion is a severe hazard. Crops that leave a large amount of residue can be grown year after year under good management that includes contour cultivation and terracing of long slopes. Sown crops that leave a large amount of residue can be safely grown year after year without terracing.

Most of this soil is wooded with shortleaf and loblolly pine or mixed pines and hardwoods. Of the small acreage that is cleared, nearly all is used for pasture.

Such crops as soybeans, grain sorghum, and winter small grains are fairly well suited to this soil. Better suited than most other pasture plants are bermudagrass, Pensacola bahiagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Capability unit IIIe–1; woodland group 2o7a.

Angie silt loam, 3 to 8 percent slopes (AnC).—This soil is in areas of 20 to 50 acres. Included with this soil in mapping are a few spots of Millwood, Oktibbeha, Sacul, and Tiak soils.

Runoff from this soil is rapid, and erosion is a very severe hazard. Because of the erosion hazard and low fertility, this soil is poorly suited to farming. Only a small acreage is cultivated, and a small acreage either is used for pasture or is idle. Most areas are wooded with shortleaf pine and loblolly pine or mixed pines and hardwoods.

Such crops as winter small grains and other sown crops that leave large amounts of residue are fairly well suited to this soil under careful management that includes contour tillage. Suitable pasture plants are bermudagrass, Pensacola bahiagrass, dallisgrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. This soil is well suited to woodland. Capability unit IVe–1; woodland group 2o7a.

Blevins Series

The Blevins series consists of deep, nearly level to gently sloping, well-drained soils on uplands and stream terraces of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is yellowish-brown loam about 7 inches thick. The subsurface layer is light yellowish-brown silt loam about 9 inches thick. The upper part of the subsoil is yellowish-brown loam that extends to a depth of about 45 inches. The lower part is yellowish-brown, mottled silt loam and loam that extends to a depth of 72 inches or more.

Blevins soils are low in natural fertility. The available water capacity is high, and permeability is moderate. The root zone is deep.

These soils are suited to most crops grown in the county. Most of the acreage is wooded. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Blevins loam, 3 to 8 percent slopes, in a moist wooded area in the SE¼SW¼SW¼ sec. 3, T. 8 S., R. 28 W.:

O1—1½ inches to ½ inch, pine needles and oak leaves.
O2—½ inch to 0, partly decomposed forest debris.
A1—0 to 7 inches, yellowish-brown (10YR 5/4) loam; moderate, medium, granular structure; very friable; many medium and fine roots; many wormholes; many fine pores; medium acid; clear, smooth boundary.
A2—7 to 16 inches, light yellowish-brown (10YR 6/4) silt loam; very friable; many medium and few fine roots; many wormholes; many fine pores; medium acid; gradual, smooth boundary.
B21t—16 to 22 inches, yellowish-brown (10YR 5/8) loam; weak, medium, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; few sand grains bridged with clay; many medium and fine roots; few wormholes; few medium pores; strongly acid; gradual, wavy boundary.
B22t—22 to 32 inches, yellowish-brown (10YR 5/8) loam; few root channels filled with yellow (10YR 7/6) fine sandy loam; moderate, medium, subangular blocky structure; friable; many, thin, patchy clay films on faces of peds; few medium and fine roots; few wormholes; many medium pores; strongly acid; gradual, wavy boundary.
B23t—32 to 45 inches, yellowish-brown (10YR 5/8) loam; moderate, medium, subangular blocky structure; friable; many, thin, patchy clay films on faces of peds; few medium and fine roots; many wormholes; many medium pores; less than 1 percent of volume is red (10R 4/6) mottles of nonindurated plinthite; strongly acid; gradual, wavy boundary.
B24t—45 to 54 inches, yellowish-brown (10YR 5/8) silt loam; few, fine, distinct, light-gray and very pale brown mottles and few, fine, prominent, yellowish-red mottles; moderate, medium, subangular blocky structure; friable; many, thin, patchy clay films on faces of peds; few medium roots; few wormholes; common fine pores; less than 1 percent of volume is red (10R 4/6) mottles of nonindurated plinthite; very strongly acid; gradual, wavy boundary.
B25t—54 to 72 inches, yellowish-brown (10YR 5/6) loam; common, medium, distinct, light-gray (10YR 7/1) mottles and few, fine, prominent, yellowish-red mottles; weak, coarse, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; few fine roots; few fine pores; less than 2 percent of volume is red (10R 4/6) mottles of nonindurated plinthite; extremely acid.

The A1 or Ap horizon is dark grayish brown to yellowish brown. The A2 horizon is pale brown to brownish yellow. Subhorizons of the Bt horizon are dark yellowish-brown, yellowish-brown, or strong-brown loam, silt loam, or sandy clay loam. Reaction is medium acid to very strongly acid in the A horizon and strongly acid to extremely acid in the B horizon.

Blevins soils are associated with Ruston, Sacul, and Savannah soils. They are browner in the B horizon than the Ruston soils. They are browner in the B horizon and are less clayey than the Sacul soils. They do not have the fragipan that Savannah soils have.

Blevins loam, 1 to 3 percent slopes (BlB).—This soil is in areas of 15 to 200 acres. Included with it in mapping are a few small areas of Ruston, Sacul, and Savannah soils.

Runoff from this soil is medium, and erosion is a moderate hazard. Although it is suited to farming, most of this soil is wooded, dominantly with pines. Of the small acreage that is cleared, nearly all is used for pasture or hay.

Clean-tilled crops that leave a large amount of residue can be grown year after year under good management that includes contour cultivation and terracing of long slopes. Such crops as winter small grains, soybeans, and cotton are suited to this soil. Better suited than most other forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIe–1; woodland group 3o1.

Blevins loam, 3 to 8 percent slopes (BlC).—This soil is in areas of 20 to 300 acres. It has the profile described as representative of the series. Included with it in mapping are a few small areas of Ruston, Sacul, and Savannah soils.

Runoff from this soil is medium to rapid, and erosion is a severe hazard. Because of the erosion hazard and low fertility, this soil is only fairly well suited to farming. Most areas of this soil are wooded, dominantly with pines.

Such crops as winter small grains and other crops that leave large amounts of residue are suited to this soil under careful management that includes contour tillage and terracing of long slopes. As slope increases, more intensive management is needed. Suitable forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIIe–2; woodland group 3o1.

Cane Series

The Cane series consists of gently sloping, moderately well drained soils that have a fragipan. These soils are on uplands of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is about 8 inches thick. This layer is yellowish-brown fine sandy loam in the upper 4 inches and strong-brown loam in the lower 4 inches. The subsoil extends to a depth of 72 inches or more. The upper 6 inches of the subsoil is yellowish-red loam, the next 10 inches is red clay loam, and the lower part is a firm, brittle fragipan of red, mottled clay loam.

Cane soils are low in natural fertility. The available water capacity is moderate, and permeability is slow. The fragipan restricts penetration of roots and water, and the root zone is only moderately deep.

These soils are suited to most crops grown in the county. Most of the acreage is used for pasture or woodland. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Cane fine sandy loam, 3 to 8 percent slopes, in a moist peach orchard in the SE¼SE¼SE¼ sec. 28, T. 9 S., R. 27 W.:

Ap—0 to 4 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, medium, granular structure; very friable; few fine roots; few wormholes; many fine pores; about 2 percent of volume is rounded quartz pebbles; medium acid; clear, smooth boundary.
A12—4 to 8 inches, strong-brown (7.5YR 5/6) loam; weak, medium, granular structure; very friable; few fine roots; few wormholes; many fine pores; few, fine, rounded quartz pebbles; medium acid; clear, smooth boundary.
B1—8 to 14 inches, yellowish-red (5YR 5/6) loam; weak, medium, subangular blocky structure; root channels filled with strong-brown (7.5YR 5/6) fine sandy loam; friable; few fine roots; few fine pores; few, fine, rounded quartz pebbles; strongly acid; abrupt, smooth boundary.
B2t—14 to 24 inches, red (2.5YR 4/6) clay loam; moderate, medium, subangular blocky structure; firm; many,

thin, patchy clay films on faces of peds and in pores; few fine roots; few wormholes; many fine pores; few, fine, rounded quartz pebbles; very strongly acid; abrupt, wavy boundary.

Bx1—24 to 50 inches, red (2.5YR 4/6) clay loam; many, coarse, prominent, light-gray (10YR 7/1) mottles; moderate, medium, subangular blocky structure; firm, compact and brittle; mottles are in polygonal seams; texture of material in the seams is fine sandy loam; few, thin, patchy clay films on faces of peds; no clay films on mottled areas; few wormholes; many fine pores; few, fine, rounded quartz pebbles; very strongly acid; gradual, wavy boundary.

Bx2—50 to 58 inches, red (2.5YR 4/6) clay loam; many, coarse, prominent, light-gray (10YR 7/1) mottles; moderate, medium, subangular blocky structure; firm, compact and brittle; mottles are in polygonal seams; texture of the material in the seams is fine sandy loam; few, thin, patchy clay films on faces of peds; no clay films on mottled areas; many fine pores; few, fine, rounded quartz pebbles; very strongly acid; gradual, wavy boundary.

Bx3—58 to 72 inches, red (2.5YR 4/6) clay loam; many, coarse, prominent, light-gray (10YR 7/1) mottles; moderate, coarse, subangular blocky structure; firm; few, fine, rounded quartz pebbles; very strongly acid.

The Ap or A1 horizon is yellowish brown, dark grayish brown, brown, strong brown, or dark yellowish brown. The B1 horizon is yellowish red or strong brown, and the B2t horizon is yellowish red or red. The Bx horizon is yellowish-red or red clay loam or sandy clay loam. Reaction is medium acid to very strongly acid in the A horizon and strongly acid or very strongly acid in the B horizon.

Cane soils are associated with Luverne, Sacul, and Savannah soils. They are less clayey in the B horizon than Luverne and Sacul soils, which lack a fragipan. They are redder in the B horizon than the Savannah soils.

Cane fine sandy loam, 3 to 8 percent slopes (CaC).—This soil is in areas of 10 to 30 acres. Included with it in mapping are a few areas where slopes are less than 3 percent and a few areas of Luverne, Sacul, and Savannah soils.

Runoff from this soil is medium to rapid, and erosion is a severe hazard. Because of the erosion hazard and low fertility, this soil is only fairly suitable for farming. Most areas are used for pasture or woodland.

Such crops as winter small grains and other crops that leave large amounts of residue are suited to this soil under careful management that includes contour tillage and terracing of long slopes. As slope increases, more intensive management is needed. Suitable forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIIe–2; woodland group 3o7a.

Demopolis Series

The Demopolis series consists of shallow, gently sloping to moderately sloping, well-drained soils on uplands in the blacklands area. The native vegetation is tall prairie grasses.

In a representative profile the surface layer is olive silty clay about 5 inches thick. Beneath this is pale-olive silty clay underlain by chalk at a depth of about 13 inches.

Demopolis soils are moderate in natural fertility. The available water capacity is low, and permeability is slow. The root zone is shallow.

These soils are better suited to native range than to most other uses. They respond poorly to fertilizer.

Representative profile of Demopolis silty clay, 3 to 12 percent slopes, severely eroded, in a moist idle area in the NW¼SE¼NE¼ sec. 29, T. 11 S., R. 27 W.:

Ap—0 to 5 inches, olive (5Y 5/3) silty clay; moderate, medium, granular structure; friable, sticky and plastic; many medium and fine roots; few wormholes; many fine pores; few fossil shells; few partly weathered chalk fragments; moderately alkaline; calcareous; clear, smooth boundary.

C—5 to 13 inches, pale-olive (5Y 6/4) silty clay; few, fine, faint, olive-gray mottles; massive; firm, sticky and plastic; few fine roots; few fine pores; few fossil shells; about 75 percent of volume is partly weathered chalk fragments; moderately alkaline; calcareous; abrupt, wavy boundary.

R—13 to 19 inches, olive-gray (5Y 5/2) chalk; horizontal platy rock structure.

The Ap horizon is olive, olive gray, grayish brown, or dark grayish brown. It is 0 to 15 percent, by volume, weathered chalk fragments. The C horizon is pale olive, olive, olive gray, light olive gray, or pale brown. It is 50 to 80 percent, by volume, weathered chalk fragments. Fossils range from 0 to 10 percent of volume in all horizons.

Demopolis soils are associated with the Sumter soils. They are more shallow and contain slightly less clay than Sumter soils and do not have a B horizon.

Demopolis silty clay, 3 to 12 percent slopes, severely eroded (DeD3).—This soil is in areas of 10 to 60 acres. Most areas have few to common, shallow and deep gullies (fig. 2). Included with this soil in mapping are a few small areas of Sumter soils.

Runoff is rapid, and the hazard of further erosion is severe. This soil is poorly suited to cultivation or woodland. It is better suited to native grass range than to most other uses. Capability unit VIe–1; woodland group 4d3c; Chalky Ridge range site.

Greenville Series

The Greenville series consists of deep, gently sloping, well-drained soils on uplands. These soils formed in sediments of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is dark reddish-brown loam about 7 inches thick. The subsoil extends to a depth of 72 inches or more. The upper 32 inches of the subsoil is dark-red clay, and the lower 40 inches is dark-red and red, mottled silty clay.

Greenville soils are moderate to low in natural fertility. The available water capacity is high, and permeability is moderately slow. The root zone is deep.

These soils are suited to most crops grown in the county. Most of the acreage is cleared and is used for pasture. Some areas are wooded with mixed pines and hardwoods. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Greenville loam, 3 to 8 percent slopes, in a moist pasture in the SE¼NW¼NW¼ sec. 27, T. 8 S., R. 27 W.:

Ap—0 to 7 inches, dark reddish-brown (5YR 3/4) loam; strong, medium, granular structure; friable; many medium and fine roots; many wormholes; many fine pores; about 5 percent of volume is rounded pebbles; neutral; clear, smooth boundary.

B21t—7 to 18 inches, dark-red (10R 3/6) clay; strong, fine and medium, angular blocky structure; friable,

Figure 2.—**A gullied area of Demopolis silty clay, 3 to 12 percent slopes, severely eroded, showing the chalk bedrock.**

slightly sticky and plastic; thick clay films on faces of peds and in pores; many medium and fine roots; few wormholes; few fine pores; about 1 percent of volume is rounded pebbles; very strongly acid; gradual, smooth boundary.

B22t—18 to 32 inches, dark-red (10R 3/6) clay; strong, medium, angular blocky structure; friable, slightly sticky and plastic; thick clay films on faces of peds and in pores; many medium and fine roots; few fine pores; few wormholes; about 2 percent of volume is rounded pebbles; very strongly acid; gradual, smooth boundary.

B23t—32 to 64 inches, dark-red (10R 3/6) silty clay; few, fine, prominent, brownish-yellow mottles; strong, medium, angular blocky structure; friable, slightly sticky and plastic; thick clay films on faces of peds and in pores; few fine roots; many medium pores; about 1 percent of volume is rounded pebbles; very strongly acid; clear, smooth boundary.

B24t—64 to 72 inches, red (2.5YR 4/6) silty clay; common, fine, prominent, brownish-yellow mottles; moderate, medium, angular blocky structure; friable; few, thin, patchy clay films on faces of peds; few fine roots; few fine pores; about 2 percent of volume is rounded pebbles; extremely acid.

The B horizon is dark-red or red sandy clay, silty clay, or clay. Reaction is neutral to medium acid in the A horizon and is strongly acid to extremely acid in the B horizon.

Because these soils have a B horizon that in most places is about 75 percent clay in the upper 20 inches and have mottles within a depth of 40 inches, they are outside the range defined for the series. These differences do not alter their usefulness or response to treatment.

Greenville soils are associated with Millwood, Sacul, and Saffell soils. They are redder than Millwood and Sacul soils. They are better drained than Sacul soils. They are redder, more clayey in the B horizon, and less gravelly than Saffell soils.

Greenville loam, 3 to 8 percent slopes (GrC).—This well-drained soil is in areas of 15 to 50 acres. Included with it in mapping are a few small areas of Millwood and Sacul soils.

Runoff from this soil is medium, and erosion is a severe hazard. Under good management that includes contour cultivation and terracing of long slopes, clean-tilled crops that leave a large amount of residue can be grown year after year in the more gently sloping areas. As slope increases, more intensive management is needed. Winter small grains and soybeans are among the crops that are suited to this soil. Better suited than most other forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIIe–2; woodland group 3o1.

Kaufman Series

The Kaufman series consists of deep, level, somewhat poorly drained soils on flood plains along streams in the blacklands area. The native vegetation is mixed hardwoods.

In a representative profile the surface layer is very dark grayish-brown clay about 22 inches thick. It is mottled below the 6-inch plow layer. The upper part of the subsoil is very dark gray, mottled clay about 19 inches thick, and the lower part is dark-gray, mottled clay about 11 inches thick. The underlying material is dark grayish-brown and olive-brown, mottled clay.

Kaufman soils are high in natural fertility. The available water capacity is high, and permeability is very slow. These soils shrink and crack as they dry, and when wet they expand and the cracks seal. The root zone is deep.

Under good management that includes surface drainage, areas of these soils that are not subject to frequent flooding are suited to most crops grown in the county. Most of the acreage is used for pasture, hay, cotton, and soybeans. Tilth is difficult to maintain because the surface layer is clayey. The soils respond well to fertilizer.

Representative profile of Kaufman clay, in a moist pasture in the SW¼SW¼SW¼ sec. 5, T. 11 S., R. 27 W.:

Ap—0 to 6 inches, very dark grayish-brown (2.5Y 3/2) clay; moderate, medium, granular structure; firm; many fine roots; many wormholes; many fine pores; neutral; clear, smooth boundary.

A12—6 to 12 inches, very dark grayish-brown (2.5Y 3/2) clay; common, medium, faint, olive-brown (2.5Y 4/4) mottles; moderate, fine, angular blocky structure; firm; many fine roots; many wormholes; few fine pores; neutral; gradual, smooth boundary.

A13—12 to 22 inches, very dark grayish-brown (2.5Y 3/2) clay; common, medium, faint, olive-brown (2.5Y 4/4) mottles; weak, medium, subangular blocky structure; very firm, sticky and plastic; common slickensides that do not intersect; common fine roots; few wormholes; few fine pores; slightly acid; gradual, smooth boundary.

B21—22 to 41 inches, very dark gray (10YR 3/1) clay; common, medium, distinct, olive-brown (2.5Y 4/4) mottles; weak, coarse, subangular blocky structure; very firm; common slickensides that do not intersect; few fine roots; few wormholes; few fine pores; slightly acid; gradual, wavy boundary.

B22—41 to 52 inches, dark-gray (10YR 4/1) clay; common, fine, faint, dark grayish-brown mottles; weak, coarse, subangular blocky structure; very firm; common intersecting slickensides; few fine roots; few wormholes; few fine pores; about 3 percent of volume is small rounded pebbles; neutral; gradual, wavy boundary.

C—52 to 72 inches, mottled dark grayish-brown (2.5Y 4/2) and olive-brown (2.5Y 4/4) clay; massive; very firm; few slickensides; few fine roots; few wormholes; few fine pores; about 5 percent of volume is small rounded pebbles; mildly alkaline.

The A horizon is very dark grayish brown to dark olive. The B horizon is very dark grayish-brown, very dark gray, dark-gray, or olive-gray clay or silty clay. Reaction ranges from slightly acid to mildly alkaline throughout the profile.

These soils typically have moist colors of very dark grayish brown in the upper 22 inches and, in this respect, are outside the range defined for the series. This difference does not alter their usefulness or response to treatment.

Kaufman soils are associated with Terouge, Marietta, and Leeper soils. They have a thinner A horizon than Terouge soils. They are more poorly drained, have a thicker, darker colored A horizon, and contain more clay than Marietta soils. Kaufman soils have a thicker, darker colored A horizon than Leeper soils.

Kaufman clay (Ka).—This soil is level and is in areas of 20 to 100 acres. Included with it in mapping are a few spots of Leeper and Terouge soils.

This soil is suitable for farming, but nearly all areas are subject to flooding in winter and in spring. Crops planted early in spring are damaged by flooding in places, and in some years crops have to be replanted. Damaging floods are infrequent between June and December. Frequency and intensity of flooding on each tract should be determined before the cropping system and pattern of land use are planned. Nearly all the acreage is used for pasture and hay crops and the soil is well suited to this use.

Under good management, crops that leave a large amount of residue can be grown year after year. Suitable crops are cotton, soybeans, and grain sorghum. Areas that are only occasionally flooded are fairly well suited to winter small grains, but flooding may damage the crop in some years. Suitable forage plants are alfalfa, bermudagrass, tall fescue, johnsongrass, dallisgrass, white clover, and annual lespedeza. Capability unit IIw–1 where occasionally flooded, capability unit IVw–1 where frequently flooded; woodland group 1w6.

Leeper Series

The Leeper series consists of deep, level, somewhat poorly drained soils on flood plains along streams in the blacklands area. The native vegetation is mixed hardwoods.

In a representative profile the surface layer is dark grayish-brown silty clay about 14 inches thick. The subsoil is dark-gray, mottled clay and extends to a depth of 40 inches. The underlying material is dark-gray and light olive-brown, mottled clay.

Leeper soils are high in natural fertility. The available water capacity is high, and permeability is very slow. These soils shrink and crack as they dry; when wet they expand and the cracks seal. The root zone is deep.

Under good management that includes surface drainage, areas of these soils that are not subject to frequent flooding are suited to most crops grown in the county. Most of the acreage is used for pasture, hay, and soybeans. Tilth is difficult to maintain because the

surface layer is clayey. These soils respond well to fertilizer.

Representative profile of Leeper silty clay, in a moist pasture in the NW¼NW¼SE¼ sec. 23, T. 10 S., R. 27 W.:

Ap—0 to 6 inches, dark grayish-brown (2.5Y 4/2) silty clay; moderate, medium, granular structure; friable, sticky and plastic; many medium and fine roots; many wormholes and crawfish holes; many fine pores; moderately alkaline and calcareous; clear, smooth boundary.

A12—6 to 14 inches, dark grayish-brown (10YR 4/2) silty clay; few, fine, distinct, light olive-brown mottles; massive; firm, sticky and plastic; many fine roots; many crawfish holes; few wormholes; few fine pores; mildly alkaline; clear, wavy boundary.

B21g—14 to 30 inches, dark-gray (10YR 4/1) clay; common, medium, distinct, yellowish-brown (10YR 5/8) mottles; massive; very firm, sticky and plastic; common slickensides; common fine roots; many crawfish holes; few wormholes; few fine pores; mildly alkaline; gradual, wavy boundary.

B22g—30 to 40 inches, dark-gray (10YR 4/1) clay; common, coarse, distinct, yellowish-brown (10YR 5/8) mottles; massive; very firm, sticky and plastic; common slickensides; common fine roots; many crawfish holes; few fine pores; mildly alkaline; gradual, wavy boundary.

Cg—40 to 72 inches, mottled dark-gray (10YR 4/1) and light olive-brown (2.5Y 5/6) clay; massive; very firm, sticky and plastic; common slickensides; few fine roots; few fine pores; moderately alkaline.

The A1 or Ap horizon is dark grayish brown to brown. The B horizon is dark grayish brown, dark gray, light brownish gray, or gray. The A horizon is slightly acid to moderately alkaline, and the B and C horizons are neutral to moderately alkaline.

Leeper soils are associated with Terouge and Kaufman soils. They have a thinner, lighter colored A horizon than the associated soils.

Leeper silty clay (Le).—This level soil is in areas of 30 to 80 acres. Included with it in mapping are a few areas of Kaufman and Terouge soils.

This soil is suitable for farming, but nearly all areas are subject to flooding in winter and in spring (fig. 3). Crops planted early in the spring are damaged by flooding in places, and in some years crops have to be replanted. Damaging floods are infrequent between June and December. Frequency and intensity of flooding on each tract should be determined before the crop-

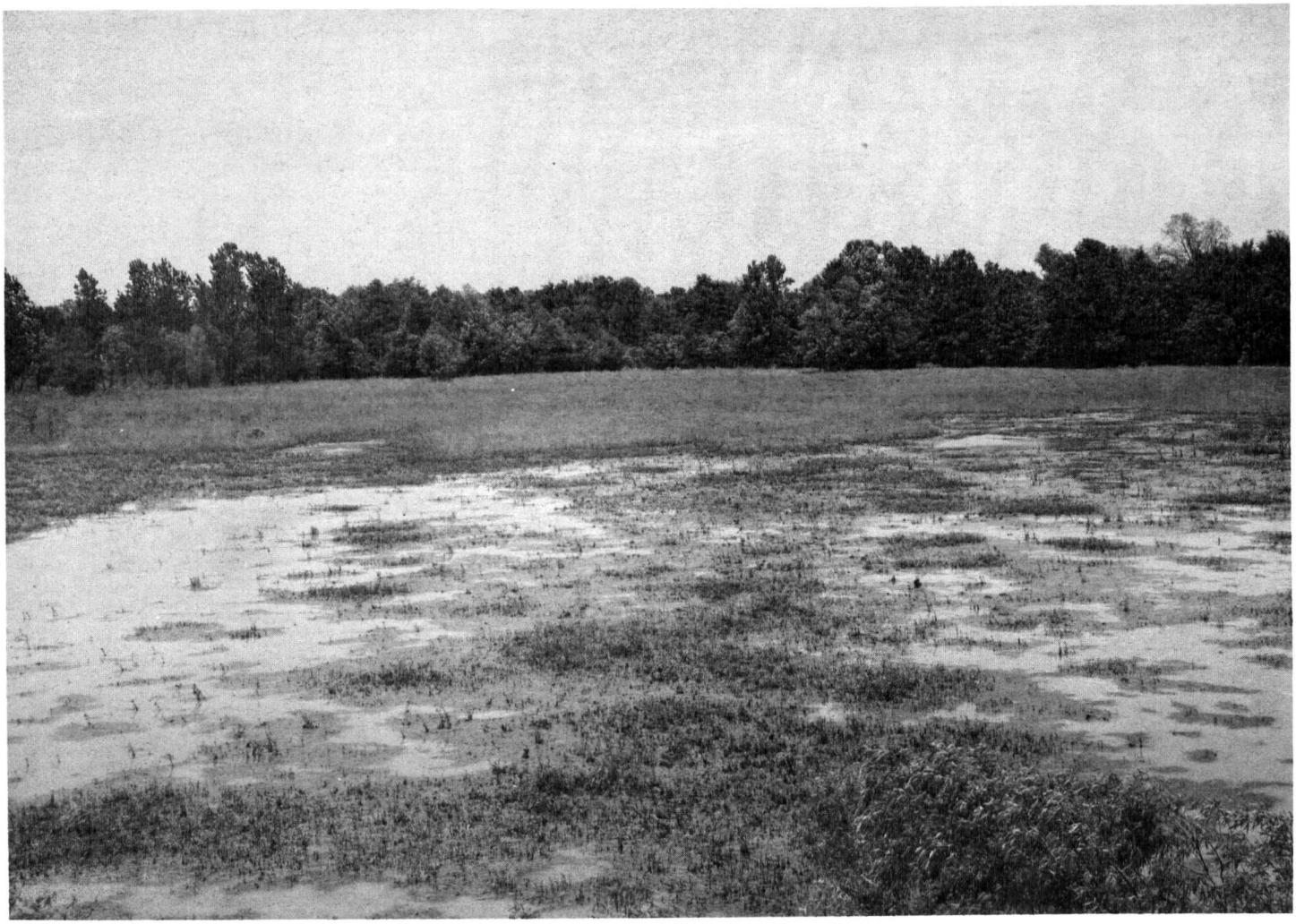

Figure 3.—**Spring flooding in an area of Leeper silty clay.**

ping system and pattern of land use are planned. Nearly all the acreage is used for pasture and hay crops and the soil is well suited to this use.

Under good management, crops that leave a large amount of residue can be grown year after year. Suitable crops are cotton, soybeans, and grain sorghum. Areas that are only occasionally flooded are fairly well suited to winter small grains, but flooding may damage the crop some years. Suitable forage plants are alfalfa, bermudagrass, tall fescue, johnsongrass, dallisgrass, white clover, and annual lespedeza. Capability unit IIw–1 where occasionally flooded, capability unit IVw–1 where frequently flooded; woodland group 1w6.

Luverne Series

The Luverne series consists of deep, moderately steep, well-drained soils on uplands. These soils formed in sediments of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is dark grayish-brown fine sandy loam about 4 inches thick. The subsurface layer is yellowish-brown fine sandy loam about 4 inches thick. The upper part of the subsoil is red sandy clay about 11 inches thick, and the lower part is thinly stratified, red sandy clay and yellowish-brown sandy loam that extends to a depth of about 26 inches. The underlying material is thinly stratified, yellowish-red sandy loam and red sandy clay loam.

Luverne soils are low in natural fertility. The available water capacity is moderate, and permeability is moderately slow. The root zone is deep.

These soils are poorly suited to crops but are suited to pasture. Most of the acreage is wooded. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Luverne fine sandy loam, 8 to 20 percent slopes, in a moist wooded area in the NW¼NE¼SE¼ sec. 4, T. 10 S., R. 28 W.:

O1—1½ inches to ½ inch, oak leaves and pine needles.
O2—½ inch to 0, partly decomposed forest debris.
A1—0 to 4 inches, dark grayish-brown (10YR 4/2) fine sandy loam; common, fine, faint, yellowish-brown mottles; moderate, medium, granular structure; very friable; many large and medium roots; few wormholes; few fine pores; strongly acid; clear, smooth boundary.
A2—4 to 8 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, medium, subangular blocky structure; very friable; many large, medium, and fine roots; few wormholes; few fine pores; strongly acid; abrupt, wavy boundary.
B21t—8 to 19 inches, red (2.5YR 4/6) sandy clay; strong, medium, subangular blocky structure; firm; thick continuous clay films on faces of peds; few clay films in pores; few large and medium roots; few fine pores; strongly acid; abrupt, wavy boundary.
B22t—19 to 26 inches, stratified red (2.5YR 4/6) sandy clay and yellowish-brown (10YR 5/8) sandy loam; moderate, medium, subangular blocky structure; very firm, hard and compact; many, thick, patchy clay films on faces of peds; few medium roots; few fine pores; very strongly acid; clear, wavy boundary.
C1—26 to 64 inches, thinly stratified yellowish-red (5YR 5/8) sandy loam and red (2.5YR 5/6) sandy clay loam; massive to platy rock structure; very firm; few fine roots on bedding planes; few fine pores; very strongly acid; gradual, wavy boundary.
C2—64 to 72 inches, thinly stratified yellowish-red (5YR 5/8) sandy loam and red (2.5YR 4/6) sandy clay loam; massive to platy rock structure; very firm; few fine roots on bedding planes; few fine pores; very strongly acid.

The A1 or Ap horizon is dark grayish brown to brown. The Bt horizon is yellowish red or red. The C horizon has yellowish-brown and gray mottles in places. The A horizon is slightly acid to very strongly acid, and the B and C horizons are strongly acid or very strongly acid.

Because these soils do not have mica flakes in the B and C horizons, they are outside the range defined for the series. This difference does not alter their usefulness or response to treatment.

Luverne soils are associated with Sacul and Millwood soils. They are better drained and are less clayey in the B horizon than Sacul soils. They are less clayey in the B horizon than Millwood soils.

Luverne fine sandy loam, 8 to 20 percent slopes (LuE).—This soil is in areas of 10 to 220 acres. Included with it in mapping are a few small areas where the slope is less than 8 percent and a few small areas of Sacul soils.

Runoff from this soil is rapid, and erosion is a severe hazard. Most of this soil is wooded, dominantly with shortleaf pine and loblolly pine. The small acreage that is cleared is nearly all used for pasture.

Suitable forage plants are bermudagrass, Pensacola bahiagrass, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit VIe–2; woodland group 3c2.

Marietta Series, Silty Subsoil Variant

The Marietta variant soils are deep, level, moderately well drained soils on flood plains. These soils formed in mixed sediments from the Gulf Coastal Plain and from the Blackland Prairies. The native vegetation is mixed hardwoods.

In a representative profile the surface layer is yellowish-brown silt loam about 5 inches thick. The upper part of the subsoil is yellowish-brown and dark-brown loam about 14 inches thick; the middle part is dark grayish-brown, mottled loam about 11 inches thick; and the lower part is grayish-brown, mottled silt loam that extends to a depth of 45 inches. The underlying material is gray, mottled silty clay loam.

Marietta soils are moderate in natural fertility. The available water capacity is moderate to high, and permeability is moderate. The root zone is deep.

Where they are not subject to frequent flooding, these soils are suited to most crops grown in the county and respond well to good management. Most of the acreage is used for forage crops. Tilth is easy to maintain. These soils respond well to fertilizer.

Representative profile of Marietta silt loam, silty subsoil variant, in a moist meadow in NW¼NW¼NE¼ sec. 16, T. 11 S., R. 27 W.:

Ap—0 to 5 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, granular structure; very friable; many medium and fine roots; few crawfish holes; many wormholes; many fine pores; neutral; clear, smooth boundary.
B21—5 to 11 inches, yellowish-brown (10YR 5/6) loam; weak, medium, subangular blocky structure; very friable; many medium and fine roots; few crawfish holes; many wormholes; many fine pores; neutral; gradual, wavy boundary.

B22—11 to 19 inches, dark-brown (10YR 4/3) loam; common, medium, faint, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; friable; many fine roots; many crawfish holes; few wormholes; few fine pores; mildly alkaline; gradual, wavy boundary.

B23—19 to 30 inches, dark grayish-brown (10YR 4/2) loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles and few, fine, faint, grayish-brown mottles; weak, medium, subangular blocky structure; friable; many fine roots; many crawfish holes; few wormholes; many fine pores; mildly alkaline; gradual, wavy boundary.

B24—30 to 45 inches, grayish-brown (10YR 5/2) silt loam; few, fine, faint, gray and yellowish-brown mottles; weak, medium, subangular blocky structure; friable; many fine roots; many crawfish holes; few wormholes; many fine pores; mildly alkaline; abrupt, wavy boundary.

C1g—45 to 61 inches, gray (10YR 5/1) silty clay loam; common, fine, distinct, dark yellowish-brown mottles; massive; firm; many fine roots; many crawfish holes; few wormholes; many fine pores; mildly alkaline; gradual, smooth boundary.

C2g—61 to 72 inches, gray (10YR 6/1) silty clay loam; common, fine, distinct, yellowish-brown mottles; massive; firm; few fine roots; many crawfish holes; few fine pores; few dark-colored concretions; mildly alkaline.

The Ap horizon is yellowish brown, brown, or dark grayish brown. The B21 and B22 horizons are dark-brown, dark yellowish-brown, or yellowish-brown loam or silt loam. The B22 horizon, in places, is mottled with brown. The B23 and B24 horizons are dark grayish-brown or grayish-brown loam or silt loam. Reaction is slightly acid to moderately alkaline throughout the profile.

Marietta soils are associated with Terouge and Kaufman soils. They are less clayey, not so dark in the upper layers, and better drained than the associated soils.

Marietta silt loam, silty subsoil variant (Ma).—This level soil is in areas of 15 to 100 acres. Included with it in mapping are a few areas of Kaufman and Terouge soils.

This soil is suitable for farming, but nearly all areas are subject to flooding in winter and in spring. Crops planted early in spring are damaged by flooding in places and in some years have to be replanted. Damaging floods are infrequent between June and December. Frequency and intensity of flooding on each tract should be determined before the cropping system and pattern of land use are planned. Nearly all the acreage is used for pasture and hay crops, and the soil is well suited to this use. This soil is also well suited to woodland.

Under good management, crops that leave large amounts of residue can be grown year after year. Suitable crops are cotton, corn, grain sorghum, and soybeans. Areas that are only occasionally flooded are fairly well suited to winter small grains, but flooding may damage the crop some years. Suitable forage plants are bermudagrass, tall fescue, johnsongrass, dallisgrass, white clover, annual lespedeza, and sericea lespedeza. Capability unit IIw–2 where occasionally flooded, capability unit IVw–2 where frequently flooded; woodland group 1w8.

Millwood Series

The Millwood series consists of deep, gently sloping and moderately sloping, well-drained soils. These soils formed in sediments of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is yellowish-brown fine sandy loam about 7 inches thick. The subsoil is clay that extends to a depth of 72 inches or more. The upper 23 inches of the subsoil is red, the next 22 inches is dominantly mottled red and gray, and the lower 20 inches or more is mottled yellowish-brown and red.

Millwood soils are medium in natural fertility. The available water capacity is high, and permeability is slow. The root zone is deep.

Most areas of these soils are used for woodland, for which they are well suited. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Millwood fine sandy loam, 3 to 8 percent slopes, in a moist wooded area in the SE¼SE¼SE¼ sec. 27, T. 10 S., R. 28 W.:

O1—1½ inches to ½ inch, oak leaves and pine needles.

O2—½ inch to 0, partly decomposed forest debris.

A1—0 to 7 inches, yellowish-brown (10YR 5/4) fine sandy loam; moderate, medium, granular structure; friable; many medium and fine roots; few wormholes; strongly acid; clear, smooth boundary.

B21t—7 to 17 inches, red (2.5YR 4/8) clay; moderate, medium, subangular blocky structure; very firm, sticky and plastic; continuous clay films on faces of peds; many medium and fine roots; few fine pores; strongly acid; gradual, wavy boundary.

B22t—17 to 30 inches, red (2.5YR 4/8) clay; common, medium, prominent, yellow (10YR 7/6) mottles; moderate, medium, subangular blocky structure; very firm, sticky and plastic; continuous clay films on faces of peds; few medium and fine roots; few fine pores; very strongly acid; gradual, wavy boundary.

B23t—30 to 41 inches, red (10R 4/8) clay; common, coarse, prominent, gray (10YR 6/1) mottles and few, fine, prominent, pale-brown mottles; moderate, medium, subangular blocky structure; very firm, sticky and plastic; continuous clay films on faces of peds; few slickensides; few roots; few fine pores; few fine pebbles; very strongly acid; clear, wavy boundary.

B24tg—41 to 52 inches, mottled gray (10YR 6/1), red (10R 4/8), and brownish-yellow (10YR 6/8) clay; moderate, coarse, subangular blocky structure; very firm, sticky and plastic; few, thick, patchy clay films on faces of peds; few pressure faces; few fine roots; few fine pores; few fine pebbles; very strongly acid; gradual, wavy boundary.

B25t—52 to 72 inches, mottled yellowish-brown (10YR 5/6) and red (2.5YR 4/8) clay; weak, coarse, subangular blocky structure; very firm, very plastic; continuous clay films on faces of peds; few slickensides; few fine roots; few fine pores; few fine pebbles; very strongly acid.

The A1 or Ap horizon is dark grayish brown to yellowish brown. The B21t, B22t, and B23t horizons are red or yellowish red. Gravel content ranges from 0 to 5 percent of volume in all horizons. Reaction is medium acid or strongly acid in the A horizon and strongly acid or very strongly acid in the B horizon.

Millwood soils are associated with Angie, Saffell, Sacul, and Luverne soils. They are more clayey in the B horizon than the associated soils. They are redder in the B horizon, and are better drained than the Angie soils. They are less gravelly than the Saffell soils.

Millwood fine sandy loam, 3 to 8 percent slopes (MlC).—This soil is in areas of 30 to 80 acres. It has the profile described as representative of the series. Included with it in mapping are a few small areas of Sacul and Angie soils.

Runoff is rapid, and erosion is a very severe hazard. Such crops as winter small grains that leave large amounts of residue can be grown occasionally if the cropping system includes grasses and legumes most of the time. Suitable forage plants are bermudagrass, Pensacola bahiagrass, dallisgrass, weeping lovegrass, sericea lespedeza, and annual lespedeza. Capability unit IVe–1; woodland group 3c2.

Millwood fine sandy loam, 8 to 12 percent slopes (MlD).—This soil is in areas of 30 to 80 acres. Included with it in mapping are a few small areas of Sacul and Luverne soils.

Runoff from this soil is rapid, and erosion is a severe hazard. Most of this soil is wooded, dominantly with shortleaf pine and loblolly pine.

This soil is not suitable for cultivation. Suitable forage plants are bermudagrass, Pensacola bahiagrass, weeping lovegrass, annual lespedeza, and sericea lespedeza. Capability unit VIe–2; woodland group 3c2.

Muskogee Series

The Muskogee series consists of deep, nearly level, moderately well drained soils in the transitional area between the blacklands and the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods and an understory of tall prairie grasses.

In a representative profile the surface layer is grayish-brown silt loam about 6 inches thick. The subsoil extends to a depth of about 61 inches. The upper 6 inches of the subsoil is strong-brown silty clay loam, the next 12 inches is strong-brown silty clay loam, the next 19 inches is gray, mottled silty clay, and the lower 18 inches is gray, mottled clay. The underlying material is gray, mottled clay.

Muskogee soils are medium in natural fertility. The available water capacity is high, and permeability is slow. The root zone is deep.

These soils are suited to most crops grown in the county. Most of the acreage is used for pasture and hay. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Muskogee silt loam, 1 to 3 percent slopes, in a moist pasture in the SW¼NE¼NW¼ sec. 8, T. 11 S., R. 27 W.:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) silt loam; few fine, distinct, yellowish-brown mottles; moderate, medium, granular structure; friable; many fine roots; few crawfish holes; medium acid; clear, smooth boundary.

B1—6 to 12 inches, strong-brown (7.5YR 5/8) silt loam; weak, medium, subangular blocky structure; friable; many fine roots; few crawfish holes; strongly acid; gradual, smooth boundary.

B21t—12 to 24 inches, strong-brown (7.5YR 5/6) silty clay loam; common, medium, distinct, light yellowish-brown (10YR 6/4) mottles; moderate, medium, angular blocky structure; firm; common thick clay films on faces of peds; many fine roots; common fine pores; few crawfish holes; very strongly acid; clear, smooth boundary.

B22tg—24 to 32 inches, gray (10YR 6/1) silty clay; common, medium, prominent, red (2.5YR 4/8) mottles and few, fine, distinct, brownish-yellow mottles; some peds have light-gray (10YR 7/1) patchy silt coatings on vertical surfaces; moderate, medium, angular blocky structure; very firm, sticky and plastic; continuous clay films on faces of peds; few fine roots; very strongly acid; gradual, smooth boundary.

B23tg—32 to 43 inches, gray (10YR 6/1) silty clay; common, medium, prominent, red (2.5YR 4/8) mottles and few, fine, faint, pale-brown mottles; moderate, medium, angular blocky structure; very firm, sticky and plastic; common thick clay films on faces of peds; few fine roots; few fine pores; very strongly acid; gradual, smooth boundary.

B24tg—43 to 61 inches, gray (10YR 6/1) clay; common, medium, prominent, red (2.5YR 4/8) mottles and common, medium, distinct, brownish-yellow (10YR 6/6) mottles; weak, medium, subangular blocky structure; very firm, sticky and plastic; few medium clay films on faces of peds; few fine roots; few fine pores; very strongly acid; gradual, wavy boundary.

Cg—61 to 72 inches, gray (10YR 6/1) clay; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles and few, fine, prominent, yellowish-red mottles; massive; very firm, sticky and plastic; few slickensides; few fine roots; few fine pores; few crawfish holes; few fine pebbles; very strongly acid.

The A1 or Ap horizon is brown, grayish brown, or dark grayish brown. The B21t horizon is strong brown or yellowish brown. The lower part of the Bt horizon is silty clay or clay. Reaction is medium acid to very strongly acid in the A horizon and strongly acid or very strongly acid in the B and C horizons.

Muskogee soils are associated with Angie and Oktibbeha soils. They are less clayey in the upper part of the B horizon than the Angie soils. They contain less clay throughout the B horizon and are not so red as the Oktibbeha soils.

Muskogee silt loam, 1 to 3 percent slopes (MuB).—This soil is in areas of 20 to 40 acres. Included with it in mapping are a few small areas of Oktibbeha and Angie soils.

Runoff from this soil is slow, and erosion is a moderate hazard.

Under good management that includes contour tillage and terracing of long slopes, clean-tilled crops that leave a large amount of residue can be grown year after year. Soybeans, winter small grains, and grain sorghum are among the crops suited to this soil. Better suited than most other forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIe–3; woodland group 2o7a.

Oktibbeha Series

The Oktibbeha series consists of deep, gently sloping to rolling, moderately well drained soils in the blacklands. The native vegetation is mixed pines and hardwoods and an understory of tall prairie grasses.

In a representative profile the surface layer is brown clay about 5 inches thick. The upper part of the subsoil is yellowish-red clay about 14 inches thick. The middle part is yellowish-red and gray, mottled clay about 10 inches thick. The lower part is brownish-yellow and yellowish-brown, mottled clay about 13 inches thick. The underlying material is gray, mottled clay that is underlain by chalk at a depth of about 51 inches.

Oktibbeha soils are medium in natural fertility. The available water capacity is high, and permeability is very slow. These soils shrink and crack as they dry, and when wet they expand and the cracks seal. The root zone is moderately deep.

These soils are better suited to pasture and hay or native grass range than to most other uses. They are suitable for woodland. Most of the acreage is used for pasture. Tilth is difficult to maintain because the surface is clayey. These soils respond well to fertilizer and lime.

Representative profile of Oktibbeha clay, 3 to 8 percent slopes, eroded, in a moist pasture area in the SW¼SE¼NE¼ sec. 34, T. 10 S., R. 27 W.:

Ap—0 to 5 inches, brown (10YR 4/3) clay that has common plow shards of yellowish-red (5YR 5/8) clay from the B21t horizon; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; moderate, medium, granular structure; firm; abundant fine roots; few crawfish holes; few wormholes; few fine pores; mildly alkaline; clear, smooth boundary.

B21t—5 to 12 inches, yellowish-red (5YR 5/8) clay; common, fine, prominent, pale-brown mottles; moderate, medium, subangular blocky structure; very firm; thick clay films or pressure faces on faces of peds; many fine roots; few crawfish holes; many fine pores; strongly acid; gradual, smooth boundary.

B22t—12 to 19 inches, yellowish-red (5YR 5/8) clay; common, medium, prominent, olive-brown (2.5Y 6/6) mottles; moderate, medium, subangular blocky structure; very firm; thick clay films on faces of peds; common slickensides; few fine roots; few crawfish holes; few fine pores; strongly acid; gradual, wavy boundary.

B23t—19 to 29 inches, yellowish-red (5YR 5/8) clay; common, medium, prominent, gray (10YR 6/1) mottles; moderate, medium, subangular blocky structure; very firm; common, thick, patchy clay films on faces of peds; common slickensides; few fine roots; few crawfish holes; few fine pores; strongly acid; gradual, wavy boundary.

B24t—29 to 33 inches, brownish-yellow (10YR 6/6) clay; common, fine, distinct, gray mottles and common, medium, prominent, yellowish-red (5YR 5/8) mottles; weak, medium, subangular blocky structure; very firm; few, thick, patchy clay films on faces of peds; few fine roots; few crayfish holes; few fine pores; strongly acid; gradual, wavy boundary.

B3—33 to 42 inches, yellowish-brown (10YR 5/6) clay; common, coarse, distinct, gray (10YR 6/1) mottles and few, fine, prominent, yellowish-red mottles; weak, medium, subangular blocky structure; very firm; pressure faces on peds; few fine roots; few crawfish holes; few fine pores; few calcium carbonate nodules; neutral; clear, wavy boundary.

IICg—42 to 51 inches, gray (10YR 6/1) clay; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; very firm; few fine roots; few crawfish holes; few fine pores; many calcium carbonate nodules; moderately alkaline and calcareous; abrupt, irregular boundary.

IIR—51 to 72 inches, chalk.

The A1 or Ap horizon is brown, reddish brown, or yellowish brown. The B21t and B22t horizons are yellowish red or red. The lower part of the Bt horizon is yellowish red, yellowish brown, or brownish yellow. The A horizon is mildly alkaline to strongly acid, the B21t through B24t horizons are strongly acid or very strongly acid, and the B3 horizon is medium acid to moderately alkaline.

Oktibbeha soils are associated with Muskogee, Terouge, and Sumter soils. They are redder and more clayey in the B horizon than Muskogee soils. They are more acid, redder, and have a thinner surface layer than Terouge soils and are more acid, redder, and deeper to chalk than Sumter soils.

Oktibbeha clay, 3 to 8 percent slopes, eroded (OkC2).—This soil is in areas of 30 to 70 acres. It has the profile described as representative of the series. Included with it in mapping are a few spots of Muskogee and Sumter soils and small areas that have a surface layer of silt loam or fine sandy loam.

Runoff from this soil is rapid, and the hazard of further erosion is very severe. This soil is poorly suited to cultivated crops. It is better suited to forage crops or woodland than to most other farm uses.

Winter small grains are among the crops that can be safely grown occasionally if the soil is used for grasses and legumes most of the time. Suitable forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, white clover, and annual lespedeza. Capability unit IVe–3; woodland group 3c8.

Oktibbeha clay, 8 to 12 percent slopes, eroded (OkD2).—This soil is in areas of 20 to 50 acres. Included with it in mapping are a few areas of Sumter soils and small areas that have a surface layer of silt loam or fine sandy loam.

Runoff from this soil is rapid, and the hazard of further erosion is severe. This soil is unsuitable for crops. It is better suited to forage crops and woodland than to most other farm uses. Suitable forage plants are bermudagrass, Pensacola bahiagrass, white clover, and annual lespedeza. Capability unit VIe–3; woodland group 3c8.

Ozan Series

The Ozan series consists of deep, level, poorly drained soils of the Gulf Coastal Plain. These soils are mainly on flood plains and low terraces along streams. Some of these soils are on upland flats. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is light brownish-gray fine sandy loam about 6 inches thick. The subsurface layer is about 9 inches of light-gray, mottled fine sandy loam that tongues into the upper part of the subsoil. The subsoil is light-gray, mottled loam that extends to a depth of 72 inches or more.

Ozan soils are low in natural fertility. The available water capacity is moderate to high, and permeability is slow. The root zone is deep.

Most of the acreage is wooded. If these soils are drained and are well managed, they are suited to most crops grown in the county. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Ozan fine sandy loam, in a moist wooded area in the SE¼SW¼NW¼ sec. 29, T. 7 S., R. 27 W.:

O1—1 to ½ inch, oak leaves and pine needles.

O2—½ inch to 0, partly decomposed forest debris.

A1—0 to 6 inches, light brownish-gray (10YR 6/2) fine sandy loam; common, fine, faint, pale-brown mottles; weak, medium, granular structure; very friable; many medium and fine roots; few wormholes; few fine pores; very strongly acid; clear, smooth boundary.

A2g—6 to 15 inches, light-gray (10YR 7/1) fine sandy loam; common, coarse, faint, pale-brown (10YR 6/3) mottles and common, fine, distinct, yellowish-brown mottles; weak, medium, subangular blocky structure; friable; many medium and fine roots; few wormholes; few fine pores; very strongly acid; gradual, irregular boundary.

B21tg—15 to 29 inches, light-gray (10YR 7/1) loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky struc-

ture; friable; few, thin, patchy clay films on faces of peds; many sand grains bridged with clay; common tongues of light-gray fine sandy loam; many clean sand grains; few fine roots; few fine pores; very strongly acid; gradual, smooth boundary.

B22tg—29 to 38 inches, light-gray (10YR 7/1) loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles and common, fine, distinct, brownish-yellow mottles; weak, medium, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; many sand grains bridged with clay; few clean sand grains; few fine roots; few fine pores; few, fine, black concretions; about 1 percent of volume is fine pebbles; strongly acid; gradual, smooth boundary.

B23tg—38 to 56 inches, light-gray (10YR 7/1) loam; common, fine, distinct, yellowish-brown mottles; weak, medium, subangular blocky structure; firm; few, thin, patchy clay films on faces of peds; many sand grains bridged with clay; few fine pores; few, fine, black concretions; about 2 percent of volume is fine pebbles; strongly acid; gradual, wavy boundary.

B3g—56 to 72 inches, light-gray (10YR 7/1) loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; friable; few, fine, black concretions; few fine pores; strongly acid.

The A1 or Ap horizon is light brownish gray to dark grayish brown. The B2tg horizon is light-gray or light brownish-gray loam or sandy clay loam. The B3g horizon is loam or sandy clay loam. Reaction is medium acid to very strongly acid in the A horizon and strongly acid or very strongly acid in the B horizon.

Ozan soils are associated with Adaton, Blevins, Toine, and Angie soils. They contain more sand than Adaton soils. They are not so brown as and are more poorly drained than Blevins and Toine soils. They contain less clay in the B horizon and are more poorly drained than Angie soils. They have an A horizon that tongues into the B horizon, which the associated soils do not have.

Ozan fine sandy loam (On).—This soil is level and poorly drained. It is on flood plains, stream terraces, and upland flats. It is in areas of 20 to 80 acres. Included with it in mapping are areas of Adaton and Blevins soils, areas that have a finer textured subsoil, and a few small areas of rounded mounds that are 50 to 100 feet in diameter and 2 to 4 feet high.

This soil is fairly well suited to farming, but excess water is a severe hazard and some areas are subject to occasional flooding. Nearly all the acreage is in woodland, for which the soil is well suited. Most areas are wooded with shortleaf and loblolly pines or with mixed pines and hardwoods.

Under good management that includes adequate drainage, crops that leave large amounts of residue can be grown year after year. Because of the wetness and the low fertility, only a small acreage is used for crops and pasture. Suitable crops are grain sorghum, soybeans, and winter small grains. Better suited than other pasture plants are bermudagrass, Pensacola bahiagrass, tall fescue, white clover, and annual lespedeza. Capability unit IIIw–1; woodland group 2w9a.

Pickens Series

The Pickens series consists of shallow, gently sloping to hilly, somewhat excessively drained soils in the Ouachita Mountains. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is dark grayish-brown shaly fine sandy loam about 6 inches thick. The subsoil is yellowish-brown shaly fine sandy loam about 6 inches thick. The underlying material is shale bedrock, which is tilted and fractured.

Pickens soils are low in natural fertility. The available water capacity is low, and permeability is moderate.

These soils are unsuited to crops. Under good management, however, they are suited to most forage plants grown in the county. Nearly all of the acreage is wooded. Tilth is fairly easy to maintain, but the root zone is shallow. The soils give a fair to poor response to lime and fertilizer.

Representative profile of Pickens shaly fine sandy loam in an area of Pickens-Sherwood-Rock land association, hilly, in a moist wooded area in the NW¼NW¼NW¼ sec. 7, T. 6 S., R. 29 W.:

O1—1½ inches to ½ inch, pine needles and oak leaves.

O2—½ inch to 0, partly decomposed forest debris.

A1—0 to 6 inches, dark grayish-brown (10YR 4/2) shaly fine sandy loam; moderate, medium, granular structure; very friable; many medium and fine roots; few wormholes; many fine pores; about 35 percent of volume is fragments of shale and sandstone; medium acid; clear, smooth boundary.

B—6 to 12 inches, yellowish-brown (10YR 5/4) shaly fine sandy loam; weak, medium, subangular blocky structure; friable; few sand grains are bridged with clay; common medium and fine roots; few wormholes; few fine pores; about 40 percent of volume is fragments of shale and sandstone; strongly acid; abrupt, irregular boundary.

R—12 to 18 inches, thinly bedded shale, tilted and fractured; few medium roots between shale lamellae.

The A1 or Ap horizon is dark grayish-brown or brown shaly fine sandy loam, shaly silt loam, stony fine sandy loam, or fine sandy loam. Content of coarse fragments is 10 to 40 percent, by volume. The B horizon is yellowish-brown or brown silt loam or fine sandy loam that is shaly or stony. Content of coarse fragments in the B horizon is 35 to 70 percent, by volume. The soil is 10 to 20 inches thick over tilted, folded, and fractured shale or interbedded shale and sandstone bedrock. Reaction is medium acid to extremely acid in the A horizon and is strongly acid to extremely acid in the B horizon.

Pickens soils are associated with the Pirum and Sherwood soils. They are shallower to bedrock than the associated soils, and unlike those soils, they lack B horizons of clay accumulation.

Pickens soils, 3 to 12 percent slopes (PcD).—The soils in this undifferentiated group are in areas of 10 to 20 acres. Their profile is similar to that described as representative of the series, but the content of coarse fragments ranges from few to many and in some places, texture of the surface layer is silt loam. Included with these soils in mapping are a few small areas of Sherwood and Pirum soils, and areas of a soil that is only 5 to 10 inches thick over shale bedrock.

Runoff from these Pickens soils is medium to rapid, and erosion is a severe hazard. The soils are somewhat droughty and are unsuited to cultivated crops.

Most areas of these soils are used for forage crops, but a few are wooded with mixed pines, redcedar, and hardwoods. Among the better suited forage plants are bermudagrass, weeping lovegrass, crimson clover, and sericea lespedeza. Capability unit VIs–1; woodland group 4d3.

Pickens-Sherwood-Rock land association, hilly (PkE). —This association is on side slopes and ridgetops in the Ouachita Mountains. Slopes range from 20 to 50 percent. Most areas are about 100 to 600 acres in size. The delineations are much larger and the composition of this unit is more variable than for most other mapping units in the county. Mapping has been controlled well enough, however, for the anticipated uses of the soils.

The Pickens soil makes up about 35 percent of the association, the Sherwood soil 35 percent, Rock land 10 percent, and included soils 20 percent.

The Pickens soil is mainly on the side slopes of ridges. It has the profile described as representative of the Pickens series. The Sherwood soil is mainly on the wider ridgetops but is also in bands on the sides and foot slopes of ridges. It has a profile similar to the one described as representative of the Sherwood series, but the content of coarse fragments ranges from few to many. Most areas of Rock land are narrow bands at the top of sharp ridges.

Included with these soils in mapping are small areas of Pirum soils, narrow strips of well-drained, loamy soil material along valley drainageways, and narrow, gently sloping ridgetops.

Runoff is rapid, and erosion is a very severe hazard if the plant cover is disturbed. All of the association is wooded with shortleaf pine, loblolly pine, or mixed pines and hardwoods (fig. 4). The soils are unsuited to cultivated crops. They are better suited to trees than to most other plants, but less steep areas of the Sherwood soil are fairly well suited to forage crops. Rock

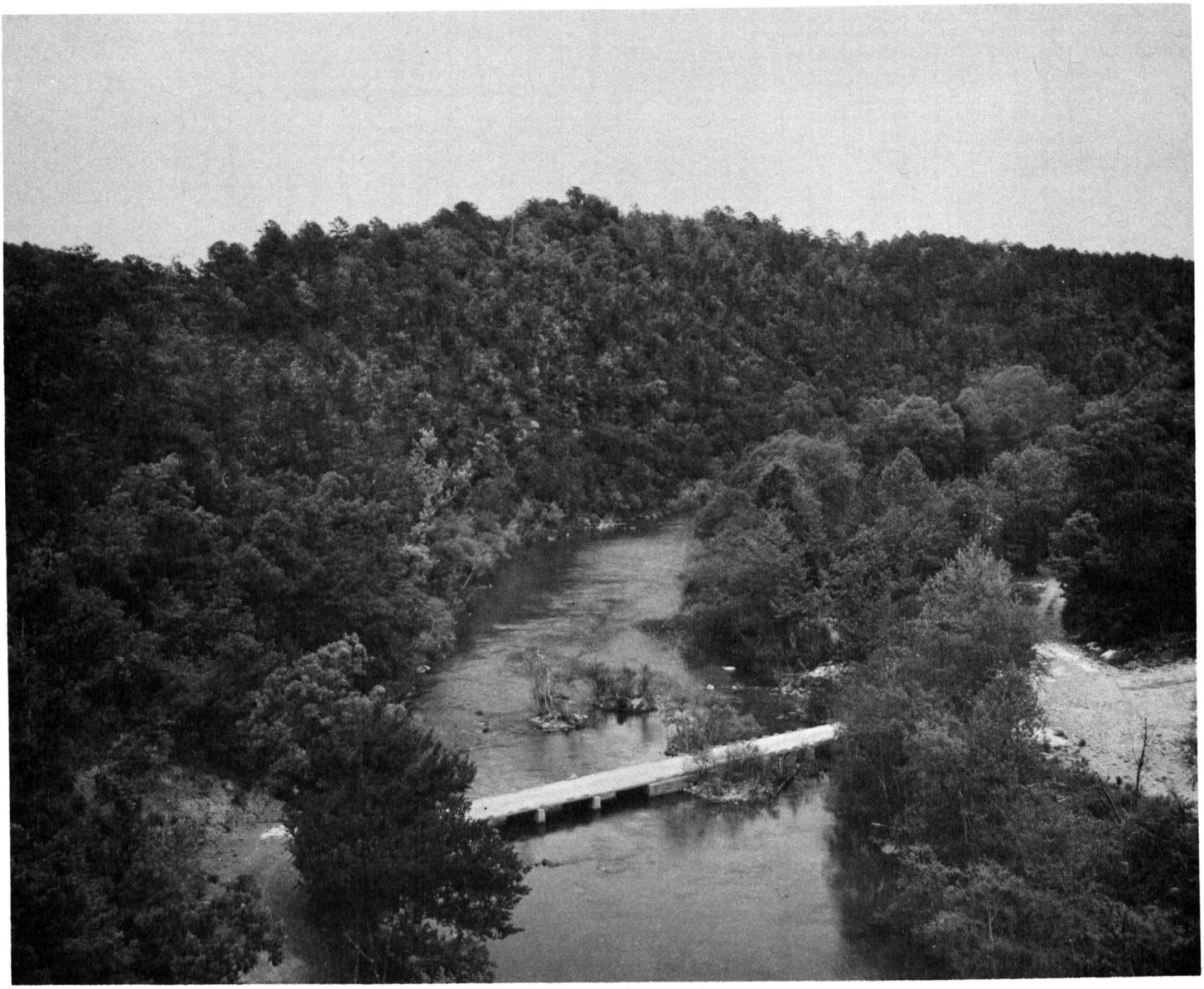

Figure 4.—**A typical forest of mixed pines and hardwoods. The soils are in the Pickens-Sherwood-Rock land association, hilly.**

land is poorly suited as woodland. Pickens soil, capability unit VIIs–1; woodland group 4d3. Sherwood soils, capability unit VIIe–2; woodland group 3o7. Rock land, capability unit VIIs–1; woodland group 5d3.

Pirum Series

The Pirum series consists of moderately deep, gently sloping or undulating soils, mainly on ridgetops in the Ouachita Mountains. Coarse fragments in this soil range from few to common. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is dark grayish-brown fine sandy loam about 6 inches thick. The subsurface layer is yellowish-brown fine sandy loam about 5 inches thick. The subsoil extends to a depth of about 36 inches. It is yellowish-brown sandy clay loam. The underlying material is tilted and fractured sandstone bedrock. These soils contain a few sandstone fragments throughout.

Pirum soils are low in natural fertility. The available water capacity and permeability are moderate. The root zone is moderately deep.

Under good management, these soils are fairly well suited to most crops and forage plants grown in the county. Most of the acreage is wooded. Tilth is easy to maintain. These soils respond well to lime and fertilizer.

Representative profile of Pirum fine sandy loam, in an area of Pirum-Sherwood association, undulating, in a moist wooded area in the NW¼SW¼NE¼ sec. 24, T. 6 S., R. 30 W.:

O1—1½ inches to ½ inch, pine needles and oak leaves.
O2—½ inch to 0, partly decomposed forest debris.
A1—0 to 6 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium, granular structure; very friable; many roots; few wormholes; few fine pores; few sandstone fragments; strongly acid; clear, smooth boundary.
A2—6 to 11 inches, yellowish-brown (10YR 5/6) fine sandy loam; common, medium, faint, pale-brown mottles; weak, medium, subangular blocky structure; very friable; many fine and medium roots; few wormholes; few fine pores; few sandstone fragments; strongly acid; clear, smooth boundary.
B21t—11 to 16 inches, yellowish-brown (10YR 5/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; common, thin, patchy clay films on faces of peds; common fine roots; few wormholes; few fine pores; few sandstone fragments; strongly acid; clear, smooth boundary.
B22t—16 to 30 inches, yellowish-brown (10YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; common, thin, patchy clay films on faces of peds; common fine and medium roots; few wormholes; few fine pores; few sandstone fragments; strongly acid; clear, wavy boundary.
B23t—30 to 36 inches, yellowish-brown (10YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; few fine and medium roots; few wormholes; few fine pores; few sandstone fragments; strongly acid; abrupt, irregular boundary.
R—36 to 40 inches, yellowish-red and gray sandstone, tilted and coarsely fractured.

The A1 or Ap horizon is dark grayish brown, brown, or yellowish brown, and the A2 horizon is yellowish brown light yellowish brown, or brownish yellow. The B2 horizon is yellowish-brown or strong-brown sandy clay loam or loam. All horizons contain from 0 to 10 percent by volume of coarse fragments. Thickness of the profile ranges from 22 to 42 inches. The A horizon is medium acid or strongly acid, and the B horizon is strongly acid or very strongly acid.

Pirum soils are associated with Sherwood and Pickens soils. They are browner in the B horizon than Sherwood soils. They are deeper to bedrock than Pickens soils, and they have a B horizon in which clay has accumulated, whereas Pickens soils have a B horizon in which clay has not accumulated.

Pirum fine sandy loam, 3 to 8 percent slopes (PmC).—This soil is in areas of 10 to 50 acres. Included with it in mapping are a few small areas of Sherwood and Pickens soils.

Runoff from this soil is medium to rapid, and erosion is a severe hazard. Most areas of this soil are used for forage crops. A few areas are wooded with shortleaf pine and loblolly pine, and others with mixed pines and hardwoods. The soil is well suited to woodland.

Under good management that includes contour tillage and terracing of long slopes, clean-tilled crops that leave a large amount of residue can be grown year after year in the less sloping areas. Intensive management is needed on the steeper slopes.

Winter small grains, soybeans, corn, and grain sorghum are among the crops that are suited to this soil. Better suited than other forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIIe–2; woodland group 3o7.

Pirum-Pickens association, undulating (PpB).—This association is in narrow valleys in the Ouachita Mountains. Slopes range from 1 to 8 percent, but are mainly more than 3 percent. Most areas are about 100 to 250 acres in size. The delineations are much larger and the composition of this unit is more variable than for other mapping units in the county. Mapping has been controlled well enough, however, for the anticipated uses of the soils.

The Pirum soil makes up about 55 percent of the association, the Pickens soil 20 percent, and included soils 25 percent.

The Pirum soil is mainly on the slightly higher elevations and on toe slopes of ridges.

Included with these soils in mapping are small areas of Sherwood soils; soils similar to Pickens soil except that they are 5 to 10 inches deep to bedrock; spots of gray, poorly drained, moderately deep soils overlying shale bedrock; and narrow strips of well-drained, loamy soil material along valley drainageways.

Runoff from these soils is medium to rapid, and erosion is severe if the plant cover is disturbed. All of this association is wooded with shortleaf pine, loblolly pine, or mixed pines and hardwoods. The soils in this association are well suited to this use, although the Pirum soil is suited to more intensive use. Among the forage crops to which the Pirum soil is suited are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Other crops to which it is fairly well suited are winter small grains, soybeans, corn, and grain sorghum, but because of the erosion hazard, careful management is needed in tilled areas. Under good management that includes contour tillage and terracing of long slopes, crops that leave a large amount of residue can be grown year after year in the less sloping areas. More intensive management is

needed in the steeper areas. The Pickens soil is not suitable for cultivation, but is fairly well suited to bermudagrass, annual lespedeza, and other forage crops. Pirum soil, capability unit IIIe–2; woodland group 3o7. Pickens soil, capability unit VIs–1; woodland group 4d3.

Pirum-Sherwood association, undulating (PsB).—This association is on ridgetops and benches in the Ouachita Mountains. Slopes range from 1 to 8 percent, but are mainly more than 3 percent. The areas are about 100 to 300 acres in size. The delineations are much larger and the composition of this unit is more variable than for other mapping units in the county. Mapping has been controlled well enough, however, for the anticipated uses of these soils.

The Pirum soil makes up about 50 percent of the association, Sherwood soil 35 percent, and included soils 15 percent. The Pirum soil in this unit has the profile described as representative of the series.

Included with these soils in mapping are areas of Pickens soils, areas that have a gravelly or stony surface layer, a few wet spots, and areas of soils that are similar to the Sherwood soil but that have a finer textured subsoil.

Runoff from these soils is medium to rapid, and erosion is a severe hazard if the plant cover is disturbed. All of the association is wooded with shortleaf pine, loblolly pine, or mixed pines and hardwoods (fig. 5). The soils are well suited to this use but are suitable for more intensive use. They are well suited to bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, sericea lespedeza, and other forage crops. Among the other crops that are suited are winter small grains, soybeans, corn, and grain sorghum, but because of the erosion hazard, careful management of tilled areas is needed. Under good management that includes contour tillage and terracing of long slopes, crops that leave a large amount of residue can be grown year after year in the less sloping areas. More intensive management is needed in the steeper areas. Capability unit IIIe–2; woodland group 3o7.

Figure 5.—**Area of Pirum-Sherwood association, undulating, which provides excellent habitat for woodland wildlife.**

Rock Land

Rock land consists of long, narrow outcrops of hard, fine-grained sandstone and novaculite on crests and side slopes of steep ridges; outcrops of shale or slate; and areas that have a 1- to 4-inch surface layer of brown, acid, loamy soil material overlying sandstone, shale, or slate bedrock.

Most areas of this land type are less than 100 feet wide and are parallel to the axes of ridges in the Ouachita Mountains. This land type is mapped only as part of the Pickens-Sherwood-Rock land association, hilly.

Ruston Series

The Ruston series consists of deep, nearly level and gently sloping, well-drained soils on uplands of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is brown fine sandy loam about 6 inches thick. The upper part of the subsoil is yellowish-red loam about 34 inches thick, and the lower part, extending to a depth of 72 inches or more, is yellowish-red fine sandy loam.

Ruston soils are low to moderate in natural fertility. The available water capacity and permeability are moderate. The root zone is deep.

These soils are suited to most crops grown in the county. Much of the acreage is used for pasture and hay, and there are large wooded tracts of mixed pines and hardwoods. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Ruston fine sandy loam, 1 to 3 percent slopes, in a moist pasture in the SE¼NE¼NW¼ sec. 29, T. 7 S., R. 27 W.:

Ap—0 to 6 inches, brown (10YR 4/3) fine sandy loam; moderate, medium, granular structure; very friable; many roots; many wormholes; few fine pores; few fine pebbles; strongly acid; clear, smooth boundary.

B21t—6 to 21 inches, yellowish-red (5YR 4/6) loam; moderate, medium, subangular blocky structure; friable; common, thin, patchy clay films on faces of peds and in some pores; many roots; few wormholes; common fine pores; strongly acid; gradual, smooth boundary.

B22t—21 to 40 inches, yellowish-red (5YR 4/6) loam; moderate, medium, subangular blocky structure; friable; many, thin, patchy clay films on faces of peds and in pores; many medium and fine roots; few wormholes; common fine pores; few fine pebbles; very strongly acid; gradual, wavy boundary.

B23t—40 to 52 inches, yellowish-red (5YR 4/8) fine sandy loam; few, fine, prominent, brownish-yellow mottles; weak to moderate, medium, subangular blocky structure; friable; sand grains are coated and bridged with clay; few roots; few wormholes; many fine pores; about 5 percent of volume is fine pebbles; very strongly acid; clear, smooth boundary.

B24t—52 to 64 inches, yellowish-red (5YR 4/8) fine sandy loam; few, fine, prominent, light yellowish-brown mottles; weak to moderate, medium, subangular blocky structure; friable; sand grains are bridged with clay; few roots; few medium pores; few fine pebbles; very strongly acid; clear, smooth boundary.

B3—64 to 72 inches, yellowish-red (5YR 5/8) fine sandy loam; few, fine, prominent, light yellowish-brown mottles; weak, coarse, subangular blocky structure; very friable; sand grains are coated and bridged with clay; few roots; few fine pores; few fine pebbles; very strongly acid.

The A1 or Ap horizon is dark grayish brown, grayish brown, or brown. The B2t horizon is yellowish-red, reddish-brown, or red loam, fine sandy loam, or sandy clay loam. The A horizon is medium acid or strongly acid, and the B horizon strongly acid or very strongly acid.

Ruston soils are associated with Blevins, Savannah, Cane, and Sacul soils. They are redder in the B horizon than Blevins and Savannah soils. They do not have the fragipan of Savannah and Cane soils and are better drained. They are less clayey in the B horizon and are better drained than Sacul soils.

Ruston fine sandy loam, 1 to 3 percent slopes (RuB).—This soil is in areas of 30 to 90 acres. It has the profile described as representative of the series. Included with it in mapping are a few small areas of Blevins and Cane soils.

Runoff from this soil is medium, and erosion is a moderate hazard.

Under good management that includes contour tillage, clean-tilled crops that leave a large amount of residue can be grown year after year. Such crops as winter small grains, grain sorghum, soybeans, and cotton are among the crops that are suited to this soil. Better suited than other forage plants are bermudagrass, Pensacola bahiagrass (fig. 6), tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIe–1; woodland group 3o1.

Ruston fine sandy loam, 3 to 8 percent slopes (RuC).—This soil is in areas of 15 to 50 acres. Included with it in mapping are a few small areas of Blevins and Cane soils.

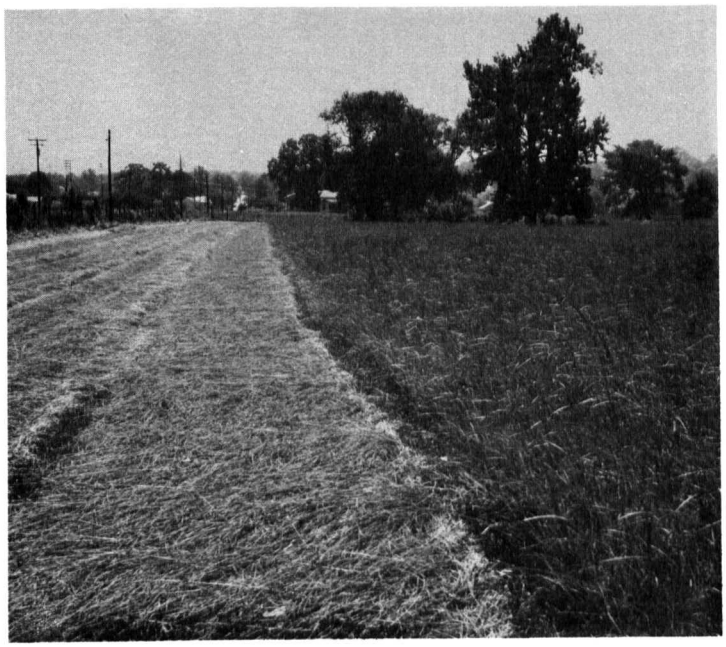

Figure 6.—**Pensacola bahiagrass in an area of Ruston fine sandy loam, 1 to 3 percent slopes.**

Runoff from this soil is medium to rapid, and erosion is a severe hazard.

Under good management that includes contour tillage and terracing of long slopes, clean-tilled crops that leave a large amount of residue can be grown year after year on the more gently sloping areas. More intensive management is needed in areas that are steeper and that have longer slopes. Winter small grains, soybeans, and grain sorghum are among the crops that are suited to this soil. Better suited than other forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIIe–2; woodland group 3o1.

Sacul Series

The Sacul series consists of deep, nearly level to moderately sloping, moderately well drained soils on uplands. These soils formed in sediments of the Gulf Coastal Plain. The native vegetation is pine and mixed hardwoods.

In a representative profile the surface layer is yellowish-brown fine sandy loam about 5 inches thick. The subsurface layer is light yellowish-brown silt loam about 8 inches thick. The upper part of the subsoil is red silty clay about 17 inches thick; the middle part is red, mottled clay loam about 12 inches thick; and the lower part is light-gray, mottled loam about 17 inches thick. The underlying material is light-gray, mottled soft shale that has silt loam texture.

Sacul soils are low in natural fertility. The available water capacity is high, and permeability is slow. The root zone is deep.

Most areas of these soils are suited to crops commonly grown in the county. Most of the acreage is wooded. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Sacul fine sandy loam, 3 to 8 percent slopes, in a moist wooded area in the NW¼NE¼NE¼ sec. 27, T. 7 S., R 28 W.:

O1—1½ inches to ½ inch, pine needles and oak leaves.

O2—½ inch to 0, partly decomposed forest debris.

A1—0 to 5 inches, yellowish-brown (10YR 5/4) fine sandy loam; moderate, medium, granular structure; very friable; many roots; many wormholes; many fine pores; about 5 percent of volume is pebbles; strongly acid; clear, smooth boundary.

A2—5 to 13 inches, light yellowish-brown (10YR 6/4) silt loam; weak, medium, subangular blocky structure; very friable; many large and fine roots; many wormholes; many medium pores; about 5 percent of volume is pebbles; strongly acid; abrupt, smooth boundary.

B21t—13 to 30 inches, red (2.5YR 4/8) silty clay; strong, medium, subangular blocky structure; firm, sticky and plastic; thick continuous clay films on faces of peds; few fine roots; few wormholes; many fine pores; about 2 percent of volume is pebbles; very strongly acid; clear, wavy boundary.

B22t—30 to 42 inches, red (2.5YR 4/8) clay loam; common, medium, prominent, light-gray (10YR 7/1) mottles and few, fine, prominent, light yellowish-brown mottles; moderate, medium, subangular blocky structure; thick clay films on most faces of peds; few roots; few wormholes; many medium pores; about 2 percent of volume is pebbles; very strongly acid; gradual, wavy boundary.

B3g—42 to 59 inches, light-gray (10YR 7/1) loam; common, medium, prominent, red (10R 4/8) mottles

and few, fine, distinct, brownish-yellow mottles; moderate, coarse, subangular blocky structure; firm; few, thin, patchy clay films on faces of peds and in pores; few fine roots; few wormholes; many medium pores; few pebbles; very strongly acid; gradual, smooth boundary.

Cg—59 to 72 inches, light-gray (10YR 7/1) soft shale of silt loam texture; common, coarse, prominent, red (2.5YR 5/8) mottles; platy rock structure; friable; about 2 percent of volume is pebbles; extremely acid.

The A1 or Ap horizon is dark grayish brown, brown, yellowish brown, or dark yellowish brown. The A2 horizon is light yellowish-brown or pale-brown silt loam or fine sandy loam. The B2t horizon is red or yellowish red, and in most places it has a subhorizon of silty clay loam or clay loam. Some profiles are silty clay throughout. The B3g horizon is gray or light-gray loam or sandy clay loam. The C horizon is light-gray or gray silt loam, fine sandy loam, or sandy clay loam. This horizon has platy rock structure or is massive. The A horizon is medium acid to strongly acid; the B horizon is strongly acid or very strongly acid; and the C horizon is very strongly acid or extremely acid.

Sacul soils are associated with Angie, Blevins, Luverne, Millwood, Tiak, and Saffell soils. They are redder in the B horizon than Angie soils. They are redder and more clayey in the B horizon than Blevins soils. They have more gray mottling and are more poorly drained than Luverne soils. They contain less clay in the B horizon than Millwood soils. They have a thinner B horizon that has less clay in the lower part than Tiak soils. They do not have the high gravel content that Saffell soils have.

Sacul fine sandy loam, 1 to 3 percent slopes (SaB).—This soil is in areas of 15 to 40 acres. Included with it in mapping are a few small areas of Blevins, Ruston, and Millwood soils.

Runoff from this soil is medium, and erosion is a severe hazard. Most of the area is wooded with shortleaf pine, loblolly pine, and hardwoods. Of the small acreage that is cleared, nearly all is used for pasture or hay.

Under good management that includes contour cultivation, clean-tilled crops that leave a large amount of residue can be grown year after year. Winter small grains and grain sorghum are among the crops that are suited to this soil. Better suited than other forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIIe-1; woodland group 3c2.

Sacul fine sandy loam, 3 to 8 percent slopes (SaC).—This soil is in areas of 30 to 100 acres. It has the profile described as representative of the series. Included with it in mapping are a few small areas of Blevins, Ruston, Tiak, and Angie soils.

Runoff from this soil is rapid, and erosion is a very severe hazard. Most of the area is wooded (fig. 7) with shortleaf pine, loblolly pine, and hardwoods. Of the small acreage that is cleared, nearly all is used for pasture.

Under good management that includes contour cultivation and terracing of long slopes, clean-tilled crops that leave a large amount of residue can be included occasionally in a cropping system in which grasses and legumes are grown most of the time. Winter small grain, grain sorghum and other crops are suited to this soil. Better suited than other forage plants are bermudagrass, Pensacola bahiagrass, tall fescue,

Figure 7.—**A 14-year-old stand of loblolly pines, selectively harvested for pulpwood, after about 10 cords per acre had been harvested in the first thinning. The soil is Sacul fine sandy loam, 3 to 8 percent slopes.**

crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IVe-1; woodland group 3c2.

Sacul fine sandy loam, 8 to 12 percent slopes (SaD).—This soil is in areas of 10 to 100 acres. Included with it in mapping are a few small areas where the slopes are more than 12 percent and small areas of Blevins, Tiak, and Angie soils.

Runoff from this soil is rapid, and erosion is a severe hazard. Most of the area is wooded with shortleaf pine, loblolly pine, and hardwoods. Of the small acreage that is cleared, nearly all is used for pasture. This soil is not suitable for cultivated crops.

Better suited than other forage plants are bermudagrass, Pensacola bahiagrass, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit VIe-2; woodland group 3c2.

Saffell Series

The Saffell series consists of deep, nearly level to moderately steep, well-drained soils. These soils formed in gravelly sediments of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is dark grayish-brown gravelly sandy loam about 8 inches thick. The upper part of the subsoil is yellowish-red and red gravelly sandy clay loam about 39 inches thick, and the lower part is strong-brown gravelly sandy loam about 15 inches thick. The underlying material is yellowish-brown gravelly sandy loam.

Saffell soils are low in natural fertility. The available water capacity is moderate to low, and permeability is moderately rapid. The root zone is deep.

These soils are best suited to forage crops and woodland. Most of the acreage is in pasture. These soils are difficult to till because of the high gravel content. They respond well to lime and fertilizer.

Representative profile of Saffell gravelly sandy loam, 3 to 8 percent slopes, in a moist peach orchard in the SW¼NE¼SW¼ sec. 22, T. 9 S., R. 28 W.:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) gravelly sandy loam; weak, fine, granular structure; friable; few roots; few wormholes; few medium pores; about 30 percent of volume is gravel; strongly acid; clear, smooth boundary.

B21t—8 to 17 inches, yellowish-red (5YR 4/8) gravelly sandy clay loam; moderate, fine, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; some sand grains are bridged with clay; thin patchy clay films on surfaces of some pebbles; few roots; few wormholes; few fine pores; about 40 percent of volume is gravel; strongly acid; clear, smooth boundary.

B22t—17 to 30 inches, red (2.5YR 4/6) gravelly sandy clay loam; weak, fine, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; some sand grains are bridged with clay; thin patchy clay films on surfaces of some pebbles; few fine roots; few large pores; about 50 percent of volume is gravel; very strongly acid; gradual, smooth boundary.

B23t—30 to 47 inches, yellowish-red (5YR 4/6) gravelly sandy clay loam; weak, fine, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; some sand grains are bridged with clay; thin patchy clay films on surfaces of some pebbles; few roots; few medium pores; about 60 percent of volume is gravel; very strongly acid; gradual, wavy boundary.

B3—47 to 62 inches, strong-brown (7.5YR 5/6) gravelly sandy loam; weak, fine, subangular blocky structure; friable; few sand grains are bridged with clay; few roots; few fine pores; about 70 percent of volume is gravel; strongly acid; gradual, wavy boundary.

C—62 to 72 inches, yellowish-brown (10YR 5/6) gravelly sandy loam; massive; friable; few fine roots; about 70 percent of volume is gravel; strongly acid.

The Ap or A1 horizon is reddish brown, dark brown, or dark grayish brown. The B2 horizon is yellowish red or red. The B3 horizon is strong brown or yellowish red. The C horizon is yellowish brown to yellowish red. Gravel content ranges from 25 to 40 percent in the A horizon and from 40 to 70 percent in the B and C horizons, and the percentage increases with increasing depth. The A horizon is medium acid or strongly acid, and the B and C horizons are strongly acid or very strongly acid.

Saffell soils are associated with Sacul, Luverne, Millwood, Blevins, and Ruston soils. They are more clayey in the B horizon than Sacul, Luverne, and Millwood soils, and they are better drained than Sacul soils. They are more gravelly than any of the associated soils.

Saffell gravelly sandy loam, 1 to 3 percent slopes (SeB).—This gravelly soil is in areas of 20 to 30 acres. Included with it in mapping are a few small areas of Sacul, Ruston, and Millwood soils and gravel pits.

Runoff from this soil is medium, and erosion is a moderate hazard. Most of the acreage is cleared and is used for pasture. Some areas are used for peach orchards (fig. 8), and a few areas are wooded with pines or mixed pines and hardwoods.

Under good management that includes contour tillage, clean-tilled crops that leave a large amount of residue can be grown year after year. Peaches, winter small grains, and other crops are suited to this soil. Better suited than other pasture plants are bermudagrass, Pensacola bahiagrass, weeping lovegrass, ball clover, crimson clover, and sericea lespedeza. Capability unit IIe-2; woodland group 4f2.

Saffell gravelly sandy loam, 3 to 8 percent slopes (SeC).—This gravelly soil is in areas of 50 to 100 acres. It has the profile described as representative of the series. Included with it in mapping are a few small areas of Sacul, Ruston, and Millwood soils, gravel pits (fig. 9), and a few small areas consisting entirely of mixed gravel and sand.

Runoff from this soil is medium, and erosion is a severe hazard. Most of the acreage is cleared and used for pasture. Some areas are used for peach orchards and a few areas are wooded with pines or mixed pines and hardwoods.

Under good management that includes contour cultivation and terracing of long slopes, clean-tilled crops that leave a large amount of residue can be grown year after year. More intensive management is needed as slope increases. Peaches and winter small grains are suited to this soil. Better suited than other pasture plants are bermudagrass, Pensacola bahiagrass, weeping lovegrass, crimson clover, ball clover, and sericea lespedeza. Capability unit IIIe-3; woodland group 4f2.

Saffell gravelly sandy loam, 8 to 20 percent slopes (SeE).—This gravelly soil is in areas of 30 to 80 acres. Included with it in mapping are a few small areas of Sacul, Millwood, and Luverne soils and gravel pits.

Runoff from this soil is rapid, and erosion is a severe hazard. This soil is not suited to tilled crops,

Figure 8.—**A peach orchard in an area of Saffell gravelly sandy loam, 1 to 3 percent slopes.**

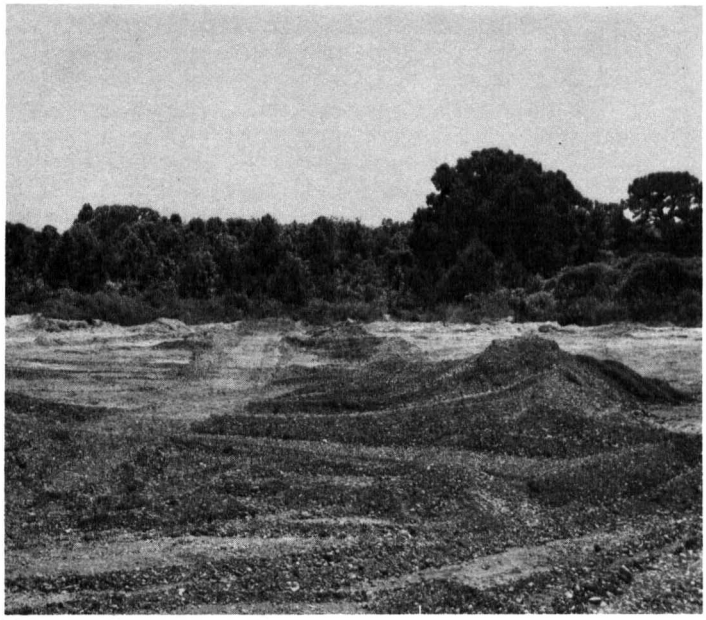

Figure 9.—**Gravel pit in an area of Saffell gravelly sandy loam, 3 to 8 percent slopes. The Saffell soils are an important source of gravel and sand.**

but it is suited to forage crops and woodland. Most of the acreage is cleared and is used for pasture. A few small areas are used for peach orchards, and a few areas are used for woodland consisting of pines or mixed pines and hardwoods.

Under good management, peach orchards can be grown in the less sloping areas. Better suited than other pasture plants are bermudagrass, Pensacola bahiagrass, weeping lovegrass, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit VIe–4; woodland group 4f2.

Savannah Series

The Savannah series consists of deep, nearly level and gently sloping, moderately well drained soils that have a fragipan. These soils are on uplands of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is brown fine sandy loam about 9 inches thick. The upper part of the subsoil is yellowish-brown loam and clay loam about 26 inches thick; the middle part, about 23 inches thick, is a firm, brittle fragipan of gray, red, and brownish-yellow, mottled clay loam; and the lower part is gray, mottled sandy clay loam that extends to a depth of 72 inches or more.

Savannah soils are low in natural fertility. The available water capacity is moderate, and permeability

is moderately slow. The fragipan restricts the penetration of water and roots, and the root zone is only moderately deep.

These soils are suited to most crops grown in the county. Most of the acreage is used for pasture or woodland. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Savannah fine sandy loam, 3 to 8 percent slopes, in a moist wooded area in the NE¼SW¼NW¼ sec. 1, T. 10 S., R. 28 W.:

O1—1 to ½ inch, pine needles and oak leaves.
O2—½ inch to 0, partly decomposed forest debris.
A1—0 to 9 inches, brown (10YR 5/3) fine sandy loam; moderate, medium, granular structure; very friable; many roots; few wormholes; strongly acid; clear, smooth boundary.
B1—9 to 20 inches, yellowish-brown (10YR 5/6) loam; weak, medium, subangular blocky structure; friable; many roots; few wormholes; few fine pores; very strongly acid; gradual, wavy boundary.
B2t—20 to 35 inches, yellowish-brown (10YR 5/6) clay loam; few, fine, prominent, yellowish-red mottles; moderate, medium, subangular blocky structure; firm; patchy clay films on faces of peds; many roots; few fine pores; few wormholes; very strongly acid; clear, wavy boundary.
Bx—35 to 58 inches, mottled gray (10YR 6/1), red (2.5YR 4/8), and brownish-yellow (10YR 6/6) clay loam; moderate, coarse, subangular blocky structure; firm, compact and brittle; thin patchy clay films on faces of peds and in pores; few roots between peds; few fine pores; very strongly acid; gradual, smooth boundary.
B3g—58 to 72 inches, gray (10YR 6/1) sandy clay loam; common, coarse, prominent, yellowish-red (5YR 5/8) mottles and common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; firm; few fine pores; very strongly acid.

The A1 or Ap horizon is dark grayish brown, brown, or yellowish brown. The B1 horizon is yellowish brown or light yellowish brown, and the B2t horizon is yellowish brown or strong brown. The A horizon is medium acid or strongly acid, and the B horizon is strongly acid or very strongly acid.

Savannah soils are associated with Cane, Blevins, Sacul, and Luverne soils. They are not so red in the B horizon as Cane soils. They have a fragipan, which the Blevins, Luverne, and Sacul soils do not have. They are not so red and contain less clay in the B horizon than Sacul and Luverne soils.

Savannah fine sandy loam, 1 to 3 percent slopes (SfB).—This soil is in areas of 20 to 30 acres. Included with it in mapping are a few small areas of Ozan and Cane soils.

Runoff from this soil is medium, and erosion is a moderate hazard. Most of this soil is wooded, dominantly with shortleaf pine and loblolly pine. Of the small acreage that is cleared, nearly all is used for pasture or hay.

Under good management that includes contour cultivation and terracing of long slopes, clean-tilled crops that leave a large amount of residue can be grown year after year. Winter small grains, grain sorghum, and soybeans are among the crops that are suited to this soil. Better suited than other forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIe–1; woodland group 3o7a.

Savannah fine sandy loam, 3 to 8 percent slopes (SfC).—This soil is in areas of 20 to 30 acres. This soil has the profile described as representative of the series. Included with it in mapping are a few small areas of Blevins, Sacul, and Cane soils.

Runoff from this soil is medium to rapid, and erosion is a severe hazard. Because of the erosion hazard and low fertility, this soil is only fairly suitable for farming. Most areas are wooded, dominantly with shortleaf pine and loblolly pine. Nearly all cleared areas are used for pasture.

Under careful management that includes contour tillage and terracing, this soil is suited to winter small grains and other crops that leave large amounts of residue. Suitable forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIIe–2; woodland group 3o7a.

Sherwood Series

The Sherwood series consists of moderately deep, well-drained, gently sloping to rolling soils in the Ouachita Mountains. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is brown and yellowish-brown fine sandy loam about 9 inches thick. The subsoil is yellowish-red sandy clay loam about 28 inches thick. Beneath this is sandstone and shale bedrock that is tilted and fractured. The soil contains a few sandstone fragments throughout the profile.

Sherwood soils are low in natural fertility. The available water capacity and permeability are moderate. The root zone is moderately deep.

Under good management, the soils on the lower slopes are fairly well suited to most crops and forage plants grown in the county. Most of the acreage is wooded. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Sherwood fine sandy loam, in a moist wooded area of Sherwood-Pickens association, rolling, in the NW¼NE¼SW¼ sec. 25, T. 6 S., R. 30 W.:

O1—1½ inches to ½ inch, pine needles and oak leaves.
O2—½ inch to 0, partly decomposed forest debris.
A11—0 to 4 inches, brown (10YR 4/3) fine sandy loam; moderate, medium, granular structure; very friable; many medium and fine roots; few wormholes; many medium pores; about 10 percent of volume is angular sandstone fragments; very strongly acid; clear, smooth boundary.
A12—4 to 9 inches, yellowish-brown (10YR 5/4) fine sandy loam; few, fine, prominent, yellowish-red mottles; weak, medium, subangular blocky structure; very friable; many medium and fine roots; few wormholes; many medium pores; about 10 percent of volume is angular sandstone fragments; very strongly acid; clear, smooth boundary.
B21t—9 to 22 inches, yellowish-red (5YR 4/8) sandy clay loam; moderate, medium, subangular blocky structure; firm; thin patchy clay films on faces of peds; many medium and small roots; few wormholes; many medium pores; about 5 percent of volume is angular sandstone fragments; very strongly acid; gradual, wavy boundary.
B22t—22 to 37 inches, yellowish-red (5YR 4/8) sandy clay loam; moderate, medium, subangular blocky struc-

ture; firm; both patchy and continuous, thin clay films on faces of peds; few medium roots; many fine pores; about 5 percent of volume is angular sandstone fragments; very strongly acid; abrupt, irregular boundary.

R—37 inches, tilted and fractured, acid, interbedded sandstone and shale.

The A1 or Ap horizon is dark grayish-brown, brown, or yellowish-brown fine sandy loam, gravelly fine sandy loam, or stony fine sandy loam. Where present, the A2 horizon is light yellowish-brown or brownish-yellow sandy loam that is gravelly in some places and stony in others. The B2 horizon is yellowish-red or red sandy clay loam, gravelly sandy clay loam, or stony sandy clay loam underlain by interbedded sandstone and shale at a depth of 21 to 48 inches. Coarse fragments in all horizons range from 0 to 25 percent of the volume. The A horizon is medium acid to very strongly acid, and the B horizon is strongly acid or very strongly acid.

Sherwood soils are associated with Pirum and Pickens soils. They are redder in the B horizon than Pirum soils. Sherwood soils are deeper to bedrock and have a B horizon in which clay has accumulated, but Pickens soils have a B horizon in which clay has not accumulated.

Sherwood fine sandy loam, 3 to 8 percent slopes (ShC).—This soil is on tops of ridges in the Ouachita Mountains. It is in areas of 20 to 60 acres. Included with it in mapping are spots of Pirum and Pickens soils.

Runoff from this soil is medium to rapid, and erosion is a severe hazard. Most of the acreage is used for forage crops. A few areas are wooded with shortleaf pine, loblolly pine, or mixed pines and hardwoods. This soil is well suited to woodland.

Under good management that includes contour tillage and terracing of long slopes, clean-tilled crops that leave a large amount of residue can be grown year after year in the less sloping areas. More intensive management is needed in the steeper areas. Winter small grains, corn, and grain sorghum are among the crops that are suited to this soil. Better suited than most other forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IIIe–2; woodland group 3o7.

Sherwood fine sandy loam, 8 to 12 percent slopes (ShD).—This soil is mainly on ridgetops in the Ouachita Mountains. It is in areas of 20 to 40 acres. Included with it in mapping are spots of Pirum and Pickens soils.

Runoff from this soil is rapid, and erosion is a very severe hazard. This soil is poorly suited to crops. Most areas of this soil are used for forage crops. A few areas are wooded with shortleaf pine, loblolly pine, or mixed pines and hardwoods. This soil is well suited to woodland.

Under good management that includes contour tillage, crops that leave a large amount of residue can be included occasionally in a cropping system in which grasses or legumes are grown most of the time. Winter small grains are suitable crops. Better suited than other forage plants are bermudagrass, Pensacola bahiagrass, crimson clover, annual lespedeza, and sericea lespedeza. Capability unit IVe–2; woodland group 3o7.

Sherwood-Pickens association, rolling (SkD).—This association is on side slopes and ridgetops in the Ouachita Mountains. Slopes range from 8 to 20 percent. Most areas are about 100 to 1,200 acres in size. The delineations are much larger and the composition of this unit is more variable than for most other mapping units in the county. Mapping has been controlled well enough, however, for the anticipated uses of the soils.

The Sherwood soil makes up about 50 percent of the association, the Pickens soil 25 percent, and included soils 25 percent.

The Sherwood soil is mainly on the wider ridgetops, but it is also in bands on the sides and foot slopes of ridges. It has the profile described as representative of the series. The Pickens soil is mainly on the side slopes of ridges.

Included with these soils in mapping are small areas of Pirum soils, spots that have gravelly or stony surface soil, Rock land, and soils underlain by shale or sandstone within a depth of 5 to 10 inches.

Runoff from this association is rapid, and erosion is a severe hazard if the plant cover is disturbed. All of the association is wooded with shortleaf pine, loblolly pine, or mixed pines and hardwoods. The soils in this association are well suited to this use, but they are not suited to crops and are poorly suited to pasture. Sherwood soil, capability unit VIe–5; woodland group 3o7. Pickens soil, capability unit VIIs–1; woodland group 4d3.

Sumter Series

The Sumter series consists of moderately deep, gently sloping to rolling, well-drained soils in the blacklands. The native vegetation is a savanna of tall prairie grasses and scattered hardwood trees.

In a representative profile the surface layer is olive clay about 4 inches thick. The upper part of the subsoil is pale-olive clay about 12 inches thick, and the lower part is gray, mottled silty clay that extends to a depth of about 29 inches. Beneath this is chalk.

Sumter soils are medium in natural fertility. The available water capacity is moderate, and permeability is slow. These soils shrink and crack as they dry, and when wet they expand and the cracks seal. The root zone is moderately deep.

These soils are not suitable for cultivated crops. Under good management, they are suited to most forage plants grown in the county. Most of the acreage is used for native grass range. Tilth is difficult to maintain because of the clayey surface layer. These soils respond well to fertilizer.

Representative profile of Sumter clay, 3 to 12 percent slopes, eroded, in a moist prairie area in the NE¼NE¼NE¼ sec. 34, T. 11 S., R. 27 W.:

Ap—0 to 4 inches, olive (5Y 4/3) clay; weak, medium, granular structure; firm, sticky and plastic; many roots; few crawfish holes; many fine pores; many fine calcium carbonate nodules; moderately alkaline and calcareous; clear, smooth boundary.

B21—4 to 9 inches, pale-olive (5Y 6/4) clay; common, fine, faint, olive-gray mottles; weak, medium, subangular blocky structure; very firm, sticky and plastic; many roots; few crawfish holes; common fine pores; few calcium carbonate nodules; moderately alkaline and calcareous; clear, smooth boundary.

B22—9 to 16 inches, pale-olive (5Y 6/4) clay; few, fine, faint, olive-gray mottles and few, fine, distinct, olive-yellow mottles; weak, medium, subangular blocky structure; very firm, sticky and plastic; com-

mon roots; few crawfish holes; few fine pores; many chalk fragments; moderately alkaline and calcareous; gradual, wavy boundary.

B3—16 to 29 inches, gray (5Y 6/1) silty clay; few, fine, distinct, olive-yellow mottles; massive; very firm, sticky and plastic; few roots; few crawfish holes; few fine pores; many chalk fragments; moderately alkaline and calcareous; abrupt, irregular boundary.

R—29 to 45 inches, chalk.

The A1 or Ap horizon is olive, dark olive gray, or dark grayish brown. The B2 horizon is pale-olive, light olive-brown, or olive clay or silty clay. The B3 horizon is gray, light olive-gray, or pale-olive silty clay or clay. Depth to chalk ranges from 25 to 50 inches.

Sumter soils are associated with Demopolis, Oktibbeha, and Terouge soils. They are shallower to chalk than Oktibbeha and Terouge soils and deeper to chalk than Demopolis soils. They are not so dark as Terouge soils, and they contain more chalk fragments. They are not so red nor so acid as Oktibbeha soils.

Sumter clay, 3 to 12 percent slopes, eroded (SmD2).—This soil is in areas of 30 to 70 acres. It has the profile described as representative of the series. Included with it in mapping are areas of Demopolis and Oktibbeha soils.

Runoff from this soil is rapid, and erosion is a severe hazard. This soil is well suited to native grass range (fig. 10) and is fairly well suited to pasture. Suitable pasture plants are bermudagrass, King Ranch bluestem, johnsongrass, dallisgrass, white clover, and sericea lespedeza. Capability unit VIe–3; woodland group 4c2c; Black Clay Prairie range site.

Sumter-Oktibbeha association, rolling (SoD).—This association is on rolling uplands. Slopes range from 8 to 20 percent. Most areas are about 100 to 1,200 acres or more in size. The delineations are much larger and the composition of this unit is more variable than for most other mapping units in the county. Mapping has been controlled well enough, however, for the anticipated uses of the soils.

The Sumter soil and the Oktibbeha soil each make up about 40 percent of the association, and the remaining 20 percent is small areas of Tiak, Sacul, Angie, and Demopolis soils, as well as areas that have been strip mined for gypsum.

Runoff from this association is rapid, and erosion is a severe hazard. Most of the association is wooded with pines, redcedar, and mixed hardwoods, but part of it is a savanna of tall prairie grasses and scattered trees, mainly postoak and redcedar. The soils are not suited to cultivated crops. They are better suited to native grass range than to most other uses. The more gently sloping areas are fairly well suited to bermudagrass, johnsongrass, dallisgrass, white clover, sericea lespedeza, and other forage plants. The Oktibbeha soil

Figure 10.—**Native grass range in excellent condition in an area of Sumter clay, 3 to 12 percent slopes, eroded. This area was a cottonfield until about 1945.**

is fairly well suited to woodland. Some large areas are strip mined for gypsum. Capability unit VIe–3. Sumter soil in woodland group 4c2c; Black Clay Prairie range site. Oktibbeha soil in woodland group 3c8.

Terouge Series

The Terouge series consists of deep, level and nearly level, somewhat poorly drained soils in the blacklands. The native vegetation is mixed hardwoods and an understory of tall grasses.

In a representative profile the soil is very dark gray, mottled clay to a depth of about 58 inches. Below this is gray, mottled clay.

Terouge soils are high in natural fertility. The available water capacity is high, and permeability is very slow. These soils shrink and crack as they dry, and when wet they expand and the cracks seal (fig. 11). The root zone is deep.

Under good management that includes surface drainage, areas of these soils that are not subject to frequent flooding are suited to most crops grown in the county. Most of the acreage is used for pasture, hay, and soybeans. Tilth is difficult to maintain because of the clayey surface. These soils respond well to fertilizer.

Representative profile of Terouge clay, 0 to 1 percent slopes, in a moist pasture in the SW¼NW¼NW¼ sec. 22, T. 11 S., R. 27 W.:

Ap—0 to 6 inches, very dark gray (10YR 3/1) clay; few, medium, prominent, olive-gray (5Y 4/2) mottles; moderate, medium, granular structure; firm, sticky and plastic; many fine roots; few crawfish holes; few fine pores; few calcium carbonate nodules; moderately alkaline and calcareous; clear, smooth boundary.

A11—6 to 31 inches, very dark gray (10YR 3/1) clay; many, medium, prominent, olive-gray (5Y 4/2) mottles; massive when wet but moderate, medium, angular blocky structure when moist; very firm, sticky and plastic; few slickensides; pressure faces on peds; many fine roots; few crawfish holes; few fine pores; many calcium carbonate nodules; moderately alkaline and calcareous; gradual, smooth boundary.

A12—31 to 58 inches, very dark gray (10YR 3/1) clay; few, fine distinct, yellowish-brown mottles and common, medium, prominent, olive-gray (5Y 4/2) mottles; massive when wet but moderate, medium, angular blocky structure when moist; very firm, sticky and plastic; few slickensides that do not intersect; pressure faces on peds; common fine roots; few crawfish holes; few fine pores; many calcium carbonate nodules; moderately alkaline and calcareous; gradual, wavy boundary.

AC—58 to 72 inches, gray (5Y 5/1) clay; many, medium, distinct, olive (5Y 5/4) and very dark gray (10YR 3/1) mottles; massive; very firm, sticky and plastic; common slickensides; common fine roots; few crawfish holes; few fine pores; common calcium carbonate nodules; moderately alkaline; calcareous.

Figure 11.—Area of a Terouge soil that shrinks and cracks when dry. In the center is a crack about 2 inches wide.

The A horizon is very dark gray, dark olive gray, or very dark grayish brown. Reaction is mildly alkaline or moderately alkaline throughout the profile.

Terouge soils are associated with Leeper, Sumter, and Kaufman soils. They do not have a B horizon, which the associated soils have. Terouge soils have a darker-colored, thicker A horizon than Leeper soils and, unlike Leeper soils, are calcareous. They have a darker-colored, thicker A horizon and are deeper to chalk than Sumter soils. They are calcareous, whereas Kaufman soils are not.

Terouge clay, 0 to 1 percent slopes (TeA).—This soil is in areas of 30 to 100 acres. It has the profile described as representative of the series. Included with it in mapping are a few spots of Leeper and Kaufman soils.

This soil is suitable for farming, but nearly all areas are subject to flooding in winter and in spring. Crops planted early in spring may be damaged by flooding and, in some years, have to be replanted. Damaging floods are infrequent between June and December. Frequency and intensity of flooding on each tract should be determined before the cropping system and the pattern of land use are planned. Nearly all of the acreage is used for pasture and hay crops, and the soil is well suited to this use.

Under good management, crops that leave a large amount of residue can be grown year after year. Suitable crops are cotton, soybeans, and grain sorghum. In areas that are only occasionally flooded, the soil is fairly well suited to winter small grains, but flooding may damage the crop some years. Suitable forage plants are alfalfa, bermudagrass, tall fescue, johnsongrass, dallisgrass, white clover, and annual lespedeza. Capability unit IIw–1, where occasionally flooded; capability unit IVw–1, where frequently flooded; woodland group 1w6.

Terouge clay, 1 to 3 percent slopes (TeB).—This soil is in areas of 30 to 50 acres. Included with it in mapping are a few areas of Kaufman and Sumter soils.

Runoff from this soil is medium, and erosion is a moderate hazard.

Under good management that includes contour cultivation and terracing on long slopes, clean-tilled crops that leave a large amount of residue can be grown year after year. Winter small grains, alfalfa, cotton, and soybeans are among the crops that are well suited to this soil. Better suited than other pasture plants are white clover, tall fescue, bermudagrass, johnsongrass, dallisgrass, and annual lespedeza. Capability unit IIe–4; woodland group 4c2c; Black Clay Prairie range site.

Tiak Series

The Tiak series consists of deep, moderately sloping and moderately steep, moderately well drained soils. These soils formed in sediments of the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is brown fine sandy loam about 5 inches thick. The upper part of the subsoil is strong-brown silty clay about 4 inches thick, and the middle part is yellowish-red and red, mottled clay about 26 inches thick. The lower part of the subsoil, about 28 inches thick, and the underlying material are gray, mottled clay.

Tiak soils are low in natural fertility. The available water capacity is high, and permeability is slow. The root zone is deep.

These soils are not suitable for crops. Most of the acreage is wooded. A few areas are in pasture. Tilth is fairly easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Tiak fine sandy loam, in an area of Tiak soils, 8 to 20 percent slopes, in a moist wooded area in the NE¼NW¼SE¼ sec. 17, T. 8 S., R. 27 W.:

O1—1 to ½ inch, pine needles and oak leaves.
O2—½ inch to 0, partly decomposed forest debris.
A1—0 to 5 inches, brown (10YR 5/3) fine sandy loam; moderate, medium, granular structure; friable; many medium and fine roots; few wormholes; many pores; about 5 percent of volume is pebbles; strongly acid; clear, smooth boundary.
B21t—5 to 9 inches, strong-brown (7.5YR 5/6) silty clay; brown (10YR 5/3) fine sandy loam in some root channels; moderate, medium, subangular blocky structure; firm; thin clay films on faces of peds; many medium and fine roots; few wormholes; few pebbles; many fine pores; very strongly acid; clear, smooth boundary.
B22t—9 to 22 inches, yellowish-red (5YR 4/6) clay; common, medium, prominent, light brownish-gray (10YR 6/2) and pale-brown (10YR 6/3) mottles; strong, medium, subangular blocky structure; very firm, sticky and plastic; thick clay films or pressure faces on faces of peds and clay films in pores; few medium and fine roots; few wormholes; very strongly acid; gradual, wavy boundary.
B23t—22 to 35 inches, red (2.5YR 5/6) clay; common, coarse, prominent, gray (10YR 6/1) mottles; strong, medium, angular and subangular blocky structure; very firm, sticky and plastic; thick clay films or pressure faces on faces of peds; clay films in pores; few medium and fine roots; few wormholes; very strongly acid; gradual, wavy boundary.
B24tg—35 to 51 inches, gray (10YR 6/1) clay; many, medium, prominent, red (10R 4/6) mottles and few, fine, prominent, light yellowish-brown mottles; moderate, medium, angular blocky structure; very firm, sticky and plastic; thick clay films or pressure faces on faces of peds; clay films in pores; few fine roots; few wormholes; few fine pores; very strongly acid; gradual, wavy boundary.
B25tg—51 to 63 inches, gray (10YR 6/1) clay; common, medium, prominent, red (2.5YR 4/8) and light yellowish-brown (2.5Y 6/4) mottles; moderate, medium, subangular blocky structure; very firm, sticky and plastic; common thick clay films on faces of peds and in pores; few slickensides; few fine roots; very strongly acid; clear, wavy boundary.
Cg—63 to 72 inches, gray (10YR 5/1) clay; common, medium, prominent, light olive-brown (2.5Y 5/4) mottles and few, fine, prominent, red mottles; massive; very firm, sticky and plastic; common slickensides; few fine roots; few fine pores; very strongly acid.

The A1 or Ap horizon is brown or dark grayish-brown fine sandy loam, silt loam, or silty clay loam. The B21t horizon is red, yellowish-red, or strong-brown silty clay or clay. The B22t and B23t horizons are red or yellowish red. The A horizon is medium acid or strongly acid, and the B and C horizons are strongly acid or very strongly acid.

Tiak soils are associated with Sacul, Millwood, and Oktibbeha soils. They have a thicker B horizon that contains more clay in the lower part than Sacul soils. They lack high base saturation, which Millwood and Oktibbeha soils have.

Tiak soils, 8 to 20 percent slopes (TkE).—This undifferentiated group is in areas of 15 to 40 acres. The soils in this group have profiles similar to the one described as representative of the series, but the surface layer is fine sandy loam, silt loam, or silty clay loam. Included with these soils in mapping are a few small areas of Sacul, Millwood, and Oktibbeha soils.

Runoff from the soils in this group is rapid, and erosion is a very severe hazard. The soils in this group are not suitable for cultivated crops. Most of the area is wooded with shortleaf pine, loblolly pine, and mixed hardwoods. Of the small acreage that is cleared, nearly all is used for pasture. Better suited than other forage plants are Pensacola bahiagrass, bermudagrass, weeping lovegrass, annual lespedeza, and sericea lespedeza. Capability unit VIIe–1; woodland group 3c2.

Toine Series

The Toine series consists of deep, level, well-drained soils on low terraces along streams in the Ouachita Mountains and on the Gulf Coastal Plain. The native vegetation is mixed pines and hardwoods.

In a representative profile the surface layer is brown loam and fine sandy loam about 13 inches thick. The upper part of the subsoil, about 42 inches thick, is dark yellowish-brown sandy clay loam that is mottled below a depth of about 31 inches. The lower part is dark yellowish-brown, mottled fine sandy loam.

Toine soils are moderate in natural fertility. The available water capacity is moderate to high, and permeability is moderate. The root zone is deep.

Where they are not frequently flooded, these soils are suited to most crops grown in the county and respond well to good management. Most of the acreage is used for forage crops. Tilth is easy to maintain. These soils respond well to fertilizer and lime.

Representative profile of Toine loam, in a moist pasture in the SE¼SW¼SE¼ sec. 7, T. 10 S., R. 28 W.:

Ap—0 to 7 inches, brown (10YR 4/3) loam; moderate, medium, granular structure; friable; many fine roots; many wormholes; common fine pores; few fine pebbles; slightly acid; gradual, smooth boundary.
A12—7 to 13 inches, brown (10YR 4/3) fine sandy loam; weak, medium, subangular blocky structure; friable; many fine roots; few wormholes; common fine pores; medium acid; clear, smooth boundary.
B21t—13 to 31 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds and in pores; many fine roots; few wormholes; few fine pores; strongly acid; clear, wavy boundary.
B22t—31 to 44 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; few, fine, faint, pale-brown and

yellowish-brown mottles; moderate, medium, subangular blocky structure; friable; few, thin, patchy clay films on faces of peds; few fine roots; few wormholes; few fine pores; very strongly acid; clear, wavy boundary.

B23t—44 to 55 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; common, fine, distinct, gray mottles and common, fine, faint, yellowish-brown mottles; weak, coarse, subangular blocky structure; friable; sand grains are coated and bridged with clay; few fine roots; few wormholes; many fine pores; very strongly acid; gradual, wavy boundary.

B3—55 to 72 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; common, medium, distinct, gray (10YR 6/1) mottles; weak, coarse, subangular blocky structure; very friable; sand grains are coated and bridged with clay; few fine roots; few wormholes; few fine pores; few dark concretions; very strongly acid.

The Ap or A1 horizon is brown or yellowish brown. The A12 horizon is brown or dark yellowish brown. The B21t horizon is dark yellowish brown or yellowish brown. The A horizon is slightly acid to strongly acid, and the B horizon is strongly acid or very strongly acid.

Toine soils are associated with Adaton, Ozan, Blevins, and Ruston soils. They are better drained and browner than Adaton and Ozan soils. They are not so well drained and have a thinner B2 horizon than Blevins soils. They are not so well drained and have a thinner B2 horizon that is not so red as that of Ruston soils.

Toine loam (To).—This level, well-drained soil is on flood plains and low stream terraces. It is in areas of 20 to 50 acres. Included with it in mapping are small areas of Adaton and Blevins soils.

This soil is suitable for farming, but nearly all areas are subject to flooding in winter and in spring. Crops planted early in spring are damaged by flooding and, in some years, have to be replanted. Damaging floods are infrequent between June and December. Frequency and intensity of flooding on each tract should be determined before the cropping system and the pattern of land use are planned. Nearly all the acreage is used for pasture and hay crops, and the soil is well suited to this use as well as to woodland.

Under good management, crops that leave a large amount of residue can be grown year after year. Suitable crops are cotton, corn, grain sorghum, and soybeans. Areas that are only occasionally flooded are fairly well suited to winter small grains, but flooding may damage the crop in some years. Suitable forage plants are bermudagrass, Pensacola bahiagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. Capability unit IIw–2, where occasionally flooded; capability unit IVw–2, where frequently flooded; woodland group 2o7.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are so used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, the kinds of soils are grouped at three levels: the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. In class VIII are soils and landforms so rough, so shallow, or otherwise so limited that they do not produce worthwhile yields of crops, forage, or wood products.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–4 or IIIw–1. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Farmers and others may find it practical to use and manage alike some of the different kinds of soils. These readers can make good use of the capability groups. Following is a descriptive outline of the capability grouping system as it applies in Howard County. The capability unit of any mapping unit in the county can

be learned by turning to the "Guide to Mapping Units" at the back of this publication or by referring to the notation at the end of the description of each mapping unit in the section "Descriptions of the Soils." In each of these descriptions, use and management of the soil is discussed briefly.

Class I soils have few limitations that restrict their use (none in Howard County).

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- Unit IIe–1.—Deep, nearly level, well drained and moderately well drained, loamy soils.
- Unit IIe–2.—Deep, nearly level, well-drained, gravelly soils.
- Unit IIe–3.—Deep, nearly level, moderately well drained, loamy soils that have a clayey subsoil.
- Unit IIe–4.—Deep, nearly level, somewhat poorly drained, clayey soils.
- Unit IIw–1.—Deep, level, somewhat poorly drained, clayey soils that are subject to occasional flooding.
- Unit IIw–2.—Deep, level, moderately well drained and well drained, loamy soils that are subject to occasional flooding.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Unit IIIe–1.—Deep, nearly level, moderately well drained, loamy soils that have a clayey subsoil.
- Unit IIIe–2.—Deep and moderately deep, gently sloping and undulating, well drained and moderately well drained, loamy soils.
- Unit IIIe–3.—Deep, gently sloping, well-drained, gravelly soils.
- Unit IIIw–1.—Deep, level, poorly drained, loamy soils.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Unit IVe–1.—Deep, gently sloping, well drained and moderately well drained, loamy soils that have a clayey subsoil.
- Unit IVe–2.—Deep, strongly sloping, well-drained, loamy soils.
- Unit IVe–3.—Deep, gently sloping, moderately well drained, clayey soils.
- Unit IVw–1.—Deep, level, somewhat poorly drained, clayey soils that are subject to frequent flooding.
- Unit IVw–2.—Deep, level, moderately well drained and well drained, loamy soils that are subject to frequent flooding.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife (none in Howard County).

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.
- Unit VIe–1.—Shallow, gently sloping and strongly sloping, well-drained, clayey soils.
- Unit VIe–2.—Deep, moderately sloping to moderately steep, well drained and moderately well drained, loamy soils that have a clayey subsoil.
- Unit VIe–3.—Deep and moderately deep, gently sloping to rolling, moderately well drained and well drained, clayey soils.
- Unit VIe–4.—Deep, strongly sloping to moderately steep, well-drained, gravelly soils.
- Unit VIe–5.—Moderately deep, rolling, well-drained, loamy soils.
- Unit VIs–1.—Shallow, gently sloping to strongly sloping and undulating, somewhat excessively drained, loamy, gravelly, and stony soils.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.
- Unit VIIe–1.—Deep, strongly sloping and moderately steep, moderately well drained, loamy soils that have a clayey subsoil.
- Unit VIIe–2.—Moderately deep, hilly, well-drained, loamy soils.
- Unit VIIs–1.—Shallow, rolling and hilly, somewhat excessively drained, loamy, gravelly,. and stony soils and Rock land.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply or to esthetic purposes (none in Howard County).

Predicted Yields[3]

The predicted yields of the principal crops shown in table 3 are based mainly on data supplied by farmers and other agricultural workers in Howard County. The level of improved management at which yields are obtained includes (a) preparing a good seedbed; (b) planting or seeding at recommended rates and at the proper time; (c) fertilizing according to needs determined by soil tests and on the basis of experience; (d) choosing well-suited, high-yielding varieties; (e) inoculating legumes; (f) controlling weeds, insects, and plant diseases; (g) cultivating at a shallow depth; (h) providing adequate drainage on wet soils; and (i) controlling grazing.

Use of the Soils for Woodland[4]

Virgin forest covered all of Howard County, except for areas of the blacklands that are mainly in the southern part of the county. These areas were prairies of tall grasses or savannas of mainly tall grasses and scattered hardwood trees.

The principal commercial trees on the flood plains and in the flatwoods areas were oaks, sweetgum, baldcypress, cottonwood, sycamore, ash, and pecan. Oaks, pine, and hickory were on the uplands.

[3] W. WILSON FERGUSON, conservation agronomist, Soil Conservation Service, helped prepare this section.

[4] JAMES T. BEENE, woodland conservationist, and IVAN R. PORTER, range conservationist, Soil Conservation Service, helped prepare this section.

TABLE 3.—*Predicted yields per acre of principal crops grown under improved management*

[Absence of a figure indicates that the crop is not suited or not commonly grown on the soil specified or that the soil is nonarable]

Soil	Corn	Cotton (lint)	Soybeans	Bermudagrass		Bahiagrass	Tall fescue
				Common	Coastal		
	Bu	*Lb*	*Bu*	*AUM* [1]	*AUM* [1]	*AUM* [1]	*AUM* [1]
Adaton silt loam			30	6.0	8.0	7.5	7.0
Angie silt loam, 1 to 3 percent slopes			20	6.0	7.5	7.5	6.0
Angie silt loam, 3 to 8 percent slopes				5.5	7.0	7.0	5.5
Blevins loam, 1 to 3 percent slopes	55	500	30	7.0	8.0	7.5	6.0
Blevins loam, 3 to 8 percent slopes	50	475	25	6.5	8.0	7.5	5.5
Cane fine sandy loam, 3 to 8 percent slopes				6.5	7.5	7.0	6.0
Demopolis silty clay, 3 to 12 percent slopes, severely eroded							
Greenville loam, 3 to 8 percent slopes				7.0	8.0	7.5	5.5
Kaufman clay	55	650	35	7.5	9.0		9.0
Leeper silty clay	55	650	35	7.5	9.0		9.0
Luverne fine sandy loam, 8 to 20 percent slopes				5.5	6.0	6.5	
Marietta silt loam, silty subsoil variant	75	700	35	7.5	9.0	9.0	9.0
Millwood fine sandy loam, 3 to 8 percent slopes				5.5	6.5	6.5	5.0
Millwood fine sandy loam, 8 to 12 percent slopes				5.0	6.0	6.0	4.5
Muskogee silt loam, 1 to 3 percent slopes	60	500	25	7.0	8.0	7.5	7.5
Oktibbeha clay, 3 to 8 percent slopes, eroded				6.0	7.0	6.0	6.0
Oktibbeha clay, 8 to 12 percent slopes, eroded				5.0	6.5	5.5	
Ozan fine sandy loam				6.0	8.0	7.5	7.0
Pickens soils, 3 to 12 percent slopes				4.5	5.5	5.0	
Pickens-Sherwood-Rock land association, hilly							
Pirum fine sandy loam, 3 to 8 percent slopes	45			6.5	7.5	7.0	5.5
Pirum-Pickens association, undulating							
Pirum-Sherwood association, undulating							
Ruston fine sandy loam, 1 to 3 percent slopes	60	500	30	7.0	8.0	7.5	6.0
Ruston fine sandy loam, 3 to 8 percent slopes	55	500	25	7.0	8.0	7.5	5.5
Sacul fine sandy loam, 1 to 3 percent slopes	45		25	5.5	7.0	6.5	5.0
Sacul fine sandy loam, 3 to 8 percent slopes				5.5	7.0	6.5	5.0
Sacul fine sandy loam, 8 to 12 percent slopes				5.0	6.5	6.0	
Saffell gravelly sandy loam, 1 to 3 percent slopes [2]				4.5	5.5	5.5	
Saffell gravelly sandy loam, 3 to 8 percent slopes [2]				4.0	5.0	5.0	
Saffell gravelly sandy loam, 8 to 20 percent slopes				3.5	4.0	4.0	
Savannah fine sandy loam, 1 to 3 percent slopes				7.0	8.0	7.5	6.5
Savannah fine sandy loam, 3 to 8 percent slopes				6.5	7.5	7.0	6.0
Sherwood fine sandy loam, 3 to 8 percent slopes	45			6.5	7.5	7.0	5.5
Sherwood fine sandy loam, 8 to 12 percent slopes				5.5	6.5	7.0	
Sherwood-Pickens association, rolling							
Sumter clay, 3 to 12 percent slopes, eroded				5.0	6.0		
Sumter-Oktibbeha association, rolling							
Terouge clay, 0 to 1 percent slopes	55	650	35	7.5	9.0		9.0
Terouge clay, 1 to 3 percent slopes	50	650	30	6.5	8.0		7.0
Tiak soils, 8 to 20 percent slopes				4.5	5.0	5.0	
Toine loam	75	700	35	7.5	9.0	9.0	9.0

[1] AUM is animal-unit-months, a term used to express the number of months that 1 animal unit can graze 1 acre without injury to the pasture. An animal unit is 1 cow or steer, 5 hogs, or 7 sheep.

[2] Peach yields of 400 bushels can be expected.

Woodland now makes up about 275,000 acres, or 72 percent, of the total land area of the county. Except for about 10,000 acres that is federally owned, including 1,246 acres of the Ouachita National Forest, nearly all of the woodland is privately owned.

A suitable secondary use for many woodland areas is grazing. The grasses, legumes, and forbs and many of the woody plants in the understory of woodlands can be used for forage. Grazing must be controlled so that the desirable tree seedlings are not damaged and the forage plants are not overgrazed.

Production of Wood Crops

Table 4 gives information that will help owners and operators of woodland to establish, manage, and harvest tree crops. The information is based on detailed plot studies, measurements of different trees on different soils, published and unpublished records, and the experience and judgment of technicians who work with tree crops in this area.

Management of woodland can be planned more effectively if soils are grouped according to the characteristics that affect growth of trees and management of the stands. The soils in Howard County have been assigned to 15 woodland suitability groups. These groups are listed in table 4. To find the woodland group to which a specific soil has been assigned, refer to the "Guide to Mapping Units" at the back of the survey or to the notation at the end of the mapping unit description. Each group consists of soils that have about the same

suitability for wood crops, potential productivity, and management requirements. These factors depend on such soil characteristics as depth; arrangement of layers in the profile; texture, drainage, color, reaction, and consistence of each layer; content of humus and minerals; degree of erosion; and slope.

Each group has been assigned a symbol that basically consists of three elements. The first element in the symbol is an Arabic numeral. It indicates the relative potential of the soils in the group for wood crops. It expresses the site quality based on one or more forest types or species. Number 1 indicates very high site index or potential productivity, followed by 2, 3, 4, and 5, the lowest potential productivity.

The second element in the symbol is a lowercase letter. It indicates the soil or physiographic characteristic that is the main cause of the limitations. The letter "w" indicates wetness; "c" indicates a limitation caused by the kind or amount of clay in the upper part of the soil profile; "d" indicates a restricted rooting depth; "f" indicates a large amount of coarse fragments in the soil; and the letter "o" indicates soil that has no significant limitations.

The third element, an Arabic numeral, indicates degree of limitations and the suitability of the soils for different kinds of trees.

The number 1 indicates that the soils have slight or no limitations and that they are best suited to needleleaf trees.

The number 2 indicates that the soils have one or more moderate limitations and that they are best suited to needleleaf trees.

The number 3 indicates that the soils have one or more severe limitations and that they are best suited to needleleaf trees.

The number 4 indicates that the soils have slight or no limitations and that they are best suited to broadleaf trees.

The number 5 indicates that the soils have one or more moderate limitations and that they are best suited to broadleaf trees.

The number 6 indicates that the soils have one or more severe limitations and that they are best suited to broadleaf trees.

The number 7 indicates that the soils have slight or no limitations and that they are suited to either broadleaf or needleleaf trees.

The number 8 indicates that the soils have one or more moderate limitations and that they are suited to either broadleaf or needleleaf trees.

The number 9 indicates that the soils have one or more severe limitations and that they are suited to either broadleaf or needleleaf trees.

In this survey, in the places where it is necessary to divide a basic group because of a difference in species of suited trees, the divisions are indicated by a lowercase letter "a" or "c".

The column headings in table 4 are explained in the following paragraphs. In the first column, headed "Woodland group," are the group symbol, a brief description of the soils in the group, and the map symbol for each soil.

Major hazards and limitations.—Under this heading are given the degree and kinds of soil-related limitations in the management of woodland. In this county equipment limitations, seedling mortality, and erosion are major concerns.

Equipment limitations refer to soil characteristics and topographic features that restrict or prohibit the use of ordinary equipment for planting, constructing roads, controlling unwanted vegetation, harvesting tree crops, and controlling fire. The limitations in Howard County are caused by wetness, texture of the surface soil, frequency and duration of flooding, and slope.

The limitation is slight if slope is less than 20 percent; if the soils are loamy, at least moderately well drained, and are not subject to flooding, or if excessive water does not accumulate on the surface; and if the use of equipment is restricted for only a short period after a heavy rain. The limitation is moderate if the slope is predominantly within the range of 20 to 40 percent; if the soils are not subject to periodic flooding, or if excessive water accumulates on the surface for extended periods; if the soils are sandy; and if equipment normally can be used from March to December. The limitation is severe if the use of equipment is limited to the driest months or to short periods between extended periods of flooding.

Seedling mortality refers to the expected loss of seedlings during the first two growing seasons after planting. Loss of seedlings in this county is caused mainly by either excessive wetness or doughtiness.

Mortality is slight if less than 25 percent of planted seedlings die and natural regeneration ordinarily is adequate. It is moderate if between 25 and 50 percent of planted seedlings die, natural regeneration is not reliable without site preparation, and replanting is necessary. Mortality is severe if more than 50 percent of the planted seedlings die, natural regeneration is not reliable, and special site preparation and replanting are necessary.

Erosion hazard depends on the steepness and the erodibility of the soil.

Potential productivity.—Under this heading the important wood crops for the soils of each group and the estimated site index are given. Site index is the average height of the dominant trees in a stand, at age 30 for cottonwood, at age 35 for sycamore, and at age 50 for other species. The higher the site index, the higher the potential productivity of the soil for wood crops.

Preferred species.—Under this heading are listed the kinds of trees to be favored for management in existing stands and those to be favored for plantings that establish or reinforce a stand. The species were selected on the basis of their growth, and of the quality, value, and marketability of the products obtained.

Understory vegetation used as forage.—Under this heading the principal plants are listed and the estimated yields by canopy class are given. The principal plants produce most of the forage if the vegetation is in excellent condition and the canopy is less than 45 percent. As the canopy closes, these plants are replaced by more shade-tolerant grasses, forbs, and woody

TABLE 4.—*Woodland groups and*

[The symbol > means more than;

Woodland groups	Major hazards and limitations	Potential productivity	
		Important wood crops	Estimated [1] site index
Group 1w6: Deep, level, somewhat poorly drained, clayey soils on flood plains; very high potential productivity; well suited to hardwoods. Ka, Le, TeA.	Severe equipment limitations and moderate to severe seedling mortality because of wetness, flooding, and texture of surface soil.	Cottonwood Sweetgum Water oaks Green ash	>106 > 96 > 96 86–95
Group 1w8: Deep, level, moderately well drained, loamy soils on flood plains; very high potential productivity; well suited to hardwoods and pines. Ma.	Moderate equipment limitations and seedling mortality mainly because of flooding.	Cottonwood Sweetgum Nuttall oak Water oaks Loblolly pine	>106 > 96 > 96 > 96 > 96
Group 2o7: Deep, level to nearly level, well-drained, loamy soils on low stream terraces; high potential productivity; suited to hardwoods and pines. To.	No serious management problems.	Loblolly pine Shortleaf pine Sweetgum	86–95 76–85 86–95
Group 2o7a: Deep, nearly level and gently sloping, moderately well drained, loamy soils on uplands; high potential productivity; suited to hardwoods and pines. AnB, AnC, MuB.	No serious management problems.	Loblolly pine Shortleaf pine Sweetgum	86–95 76–85 86–95
Group 2w9a: Deep, level, poorly drained, loamy soils on low terraces and in flatwoods; high potential productivity; suited to hardwoods and pines. Ad, On.	Severe equipment limitations and severe seedling mortality mainly because of excess water.	Loblolly pine Shortleaf pine Sweetgum	86–95 76–85 86–95
Group 3o1: Deep, nearly level and gently sloping, well-drained, loamy soils on uplands and stream terraces; moderately high potential productivity; better suited to pines. BlB, BlC, GrC, RuB, RuC.	No serious management problems.	Loblolly pine Shortleaf pine	76–85 70–80
Group 3o7: Deep and moderately deep, nearly level to hilly, moderately well drained and well drained, loamy soils on uplands; moderately high potential productivity; suited to hardwoods and pines. PmC, PpB, PsB, ShC, ShD, SkD. For Pickens part of PpB and SkD, refer to group 4d3.	No serious management problems.	Loblolly pine Shortleaf pine	76–85 66–75
Group 3o7a: Deep, nearly level and gently sloping, moderately well drained, loamy soils that have a fragipan; on uplands; moderately high potential productivity; suited to hardwoods and pines. CaC, SfB, SfC.	No serious management problems.	Loblolly pine Shortleaf pine Sweetgum	76–85 66–75 76–85
Group 3c2: Deep, nearly level to moderately steep, moderately well drained and well drained, loamy soils that have a clayey subsoil; on uplands; moderately high potential productivity; best suited to pines. LuE, MlC, MlD, SaB, SaC, SaD, TkE.	Slight to moderate equipment limitations, slight to moderate seedling mortality, and moderate erosion hazard because of the thin surface soil and the slope.	Loblolly pine Shortleaf pine	76–85 66–75
Group 3c8: Moderately deep, gently sloping to moderately steep, moderately well drained, clayey soils on uplands; moderately high potential productivity; suited to hardwoods, pines, and redcedar. OkC2, OkD2.	Moderate equipment limitations and seedling mortality.	Loblolly pine Shortleaf pine Redcedar	76–85 66–75 46–55
Group 4d3: Shallow, gently sloping to hilly, somewhat excessively drained, loamy soils on uplands; moderate potential productivity; best suited to pines and redcedar. PcD, PkE. For Sherwood part of PkE refer to group 3o7, and for Rock land part, refer to group 5d3.	Severe erosion hazard; moderate to severe equipment limitations and seedling mortality.	Loblolly pine Shortleaf pine Redcedar	66–75 56–65 35–45

factors in woodland management

the symbol < means less than]

Preferred species		Understory vegetation used as forage	
In existing stands	For planting	Principal plants (excellent condition)	Estimated yields by canopy class (yearly growth)
			Pounds of air-dry forage per acre
Cottonwood, sweetgum, sycamore, water oaks, Nuttall oak, cow oak, cherrybark oak, overcup oak, hackberry, Shumard oak.	Sweetgum, sycamore, green ash, Nuttall oak, cherrybark oak, cow oak, Shumard oak.	Eastern gamagrass, switchgrass, Virginia wildrye, plumegrasses, beaked panicum, velvetgrass, sedges, flat sedges.	Open: 4,000–7,000 Sparse: 2,500–5,000 Medium: 1,500–3,000 Dense: 400–2,000
Sweetgum, cottonwood, Nuttall oak, cherrybark oak, Shumard oak, southern red oak, cow oak, water oaks, green ash, sycamore, silver maple, hackberry, loblolly pine.	Cherrybark oak, cow oak, Shumard oak, cottonwood, sycamore, sweetgum, green ash, silver maple, loblolly pine.	Switchgrass, eastern gamagrass, Virginia wildrye, switchcane, big bluestem, meadow dropseed, beaked panicum, low panicums, sedges.	Open: 4,000–7,500 Sparse: 3,000–5,000 Medium: 1,500–3,500 Dense: 100–2,000
Loblolly pine, shortleaf pine, sweetgum, cherrybark oak, Shumard oak, southern red oak, white oak, water oaks, black walnut, black cherry.	Loblolly pine, shortleaf pine, cherrybark oak, Shumard oak, yellow-poplar, black walnut, cottonwood, sycamore, sweetgum.	Little bluestem, big bluestem, switchgrass, indiangrass, plumegrasses, beaked panicum, low panicums, Virginia wildrye.	Open: 4,000–7,000 Sparse: 3,000–5,000 Medium: 1,500–3,500 Dense: 100–2,000
Loblolly pine, shortleaf pine, sweetgum, water oaks, cow oak, cherrybark oak, southern red oak, Shumard oak.	Loblolly pine, shortleaf pine, sweetgum, cherrybark oak, Shumard oak, yellow-poplar.	Plumegrasses, beaked panicum, longleaf uniola, spike uniola, little bluestem, big bluestem, switchgrass, low panicums.	Open: 4,000–6,000 Sparse: 2,000–5,000 Medium: 1,000–2,500 Dense: 400–1,200
Loblolly pine, shortleaf pine, sweetgum, water oaks, cherrybark oak, southern red oak, cow oak, Shumard oak, Nuttall oak.	Loblolly pine, sweetgum, sycamore, Nuttall oak, Shumard oak.	Switchgrass, big bluestem, little bluestem, velvetgrass, beaked panicum, low panicums, plumegrasses, longleaf uniola, spike uniola, sedges, flat sedges.	Open: 3,000–4,000 Sparse: 1,500–3,000 Medium: 1,000–2,000 Dense: 200–1,500
Loblolly pine, shortleaf pine	Loblolly pine, shortleaf pine	Big bluestem, little bluestem, indiangrass, plumegrasses, longleaf uniola, spike uniola, beaked panicum, low panicums.	Open: 4,500–6,000 Sparse: 2,000–5,000 Medium: 1,000–2,500 Dense: 100–1,500
Loblolly pine, shortleaf pine, sweetgum, red oaks, white oaks.	Loblolly pine, shortleaf pine, white oaks, red oaks.	Big bluestem, little bluestem, indiangrass, beaked panicum, low panicums, longleaf uniola, spike uniola, low panicums.	Open: 4,000–6,000 Sparse: 2,000–5,000 Medium: 1,000–2,500 Dense: 200–1,500
Loblolly pine, shortleaf pine, sweetgum, red oaks, white oaks.	Loblolly pine, sweetgum, shortleaf pine.	Big bluestem, little bluestem, indiangrass, beaked panicum, low panicums, longleaf uniola, spike uniola.	Open: 4,000–6,000 Sparse: 2,000–5,000 Medium: 1,000–2,500 Dense: 200–1,500
Loblolly pine, shortleaf pine	Loblolly pine, shortleaf pine	Beaked panicum, big bluestem, little bluestem, indiangrass, longleaf uniola, plumegrasses, low panicums, paspalums.	Open: 4,000–5,000 Sparse: 2,000–4,000 Medium: 1,000–2,500 Dense: 200–1,200
Loblolly pine, shortleaf pine, redcedar, red oaks.	Loblolly pine, shortleaf pine, redcedar.	Big bluestem, little bluestem, indiangrass, longleaf uniola, plumegrasses, paspalums, low panicums.	Open: 4,000–6,000 Sparse: 2,000–4,500 Medium: 1,000–2,500 Dense: 200–1,200
Loblolly pine, shortleaf pine, redcedar, red oaks, white oaks.	Loblolly pine, shortleaf pine, redcedar.	Little bluestem, blackseed needlegrass, low panicums, tall dropseed, longleaf uniola.	Open: 3,000–4,500 Sparse: 1,000–3,500 Medium: 600–2,000 Dense: 100–1,000

TABLE 4.—*Woodland groups and factors*

Woodland groups	Major hazards and limitations	Potential productivity	
		Important wood crops	Estimated [1] site index
Group 4d3c: Shallow, gently sloping and moderately sloping, well-drained, clayey soils on uplands; moderate potential productivity; best suited to redcedar. DeD3.	Severe erosion hazard; moderate to severe equipment limitations; severe seedling mortality.	Redcedar	35–45
Group 4c2c: Moderately deep and deep, nearly level to rolling, somewhat poorly drained and well drained, clayey soils on uplands; moderate potential productivity; best suited to redcedar. SmD2, SoD, TeB. For Oktibbeha part of SoD, refer to group 3c8.	Moderate erosion hazard, equipment limitations, and seedling mortality.	Redcedar	35–45
Group 4f2: Deep, nearly level to moderately steep, well-drained, gravelly soils on uplands; moderate potential productivity; best suited to pines and redcedar. SeB, SeC, SeE.	Moderate seedling mortality because of droughtiness.	Loblolly pine Shortleaf pine Redcedar	66–75 56–65 35–45
Group 5d3: Hilly, excessively drained, folded and fractured sandstone, novaculite, and shale; low potential productivity; best suited to pines and redcedar. Rock land part of PkE.	Severe equipment limitations and seedling mortality.	Loblolly pine Shortleaf pine Redcedar	< 65 < 55 < 35

[1] Site class ratings adapted from data gathered in soil-site studies by the Soil Conservation Service and the Forest Service (*10, 11, 13, 14*).

plants and the yields of forage become progressively less.

In Howard County, four canopy classes are recognized. Open canopy means that as much as 20 percent of the ground is shaded at midday; sparse, that 21 to 35 percent is shaded; medium, that 36 to 55 percent is shaded; and dense, that 56 to 70 percent is shaded. If more than 70 percent of the ground is shaded at midday, little or no forage is produced.

Production of Forage

The amount of forage produced in woodland varies with the age of the trees, the density of the canopy, and the condition of the understory vegetation.

Forage condition is the present state of the understory vegetation as compared with the potential for a particular site. Four classes of forage condition are recognized. They provide a measure of any deterioration that has taken place and a basis for predicting the degree of improvement that can be brought about by management. Excellent forage condition indicates that the present understory forage species make up 75 percent or more of the potential composition for the site; good condition, between 51 and 75 percent; fair condition, between 26 and 50 percent; and poor condition, less than 25 percent.

Use of the Soils for Range [5]

About 30,000 acres, mostly in the southern part of the county, was native grass prairie when the first settlers came. Because of the lack of tree cover and the apparent high productivity of the dark soils, these tracts in this area were among the first to be farmed. As row cropping became marginal, some of the area was developed for improved pasture and some reverted to native grasses.

On well-managed range, the vegetation consists of numerous legumes and forbs and a mixture of tall grasses, principally little bluestem and indiangrass.

Range Sites and Condition Classes

Different kinds of soils vary in their capacity to produce grass and other vegetation. The soils that have similar climatic and physiographic features and that produce about the same kinds and amounts of forage are grouped together for range management purposes. These groups are called range sites. Each range site has its own distinctive potential for producing native plants and retains its ability to reproduce this plant community unless the soils are materially altered or have deteriorated.

Range condition is determined mainly by comparing the kind and relative proportion of plants that make up the existing vegetative cover with those in the potential native plant cover, or climax vegetation, for that site.

Climax vegetation is the stabilized plant cover on a particular site. It reproduces itself and does not change so long as the environment remains unchanged.

Decreasers are plants in the climax vegetation that tend to decrease in number if heavily grazed. These plants generally are the tallest, most productive, and most palatable perennials.

[5] IVAN R. PORTER, range conservationist, Soil Conservation Service, helped prepare this section.

in woodland management—Continued

Preferred species		Understory vegetation used as forage	
In existing stands	For planting	Principal plants (excellent condition)	Estimated yields by canopy class (yearly growth)
Redcedar, osage-orange	Redcedar	Little bluestem, indiangrass, side-oats grama, Virginia wildrye, prairie-clover, compassplant, sensitivebrier.	*Pounds of air-dry forage per acre* Open: 2,500–4,000 Sparse: 1,500–3,000 Medium: 500–2,000 Dense: 200–1,000
Redcedar, osage-orange	Redcedar	Big bluestem, little bluestem, indiangrass, switchgrass, low panicums, paspalums, compassplant, prairie-clover, native lespedezas.	Open: 4,500–6,000 Sparse: 3,000–5,000 Medium: 2,000–4,000 Dense: 400–2,000
Loblolly pine, shortleaf pine, redcedar.	Loblolly pine, shortleaf pine, redcedar.	Big bluestem, little bluestem, indiangrass, Virginia wildrye, skeletongrass, low panicums, native lespedezas.	Open: 2,500–4,000 Sparse: 1,500–3,000 Medium: 800–2,000 Dense: 500–1,000
Loblolly pine, shortleaf pine, redcedar.	Loblolly pine, shortleaf pine, redcedar (hand planting or direct seeding only).	Little bluestem, blackseed needlegrass, indiangrass, side-oats grama, low panicums, prairie-clover, native lespedezas.	Open: 2,500–4,000 Sparse: 1,500–3,000 Medium: 1,000–2,500 Dense: 200–1,200

Increasers are plants in the climax vegetation that normally increase in number as the decreasers are reduced. These plants commonly are the shorter, less productive, less palatable plants.

Invaders are plants that are not a part of the climax vegetation but that become established after the climax vegetation has been heavily grazed. Many invaders are woody plants; some are herbaceous perennials and annuals. They may originate nearby or at a great distance.

Range condition indicates the degree to which the composition of the existing plant community differs from the climax vegetation. Four classes are recognized. A range is in excellent condition if 76 to 100 percent of the vegetation is of the same kind as that in the original stand; it is in good condition if the percentage is between 51 and 75; in fair condition if the percentage is between 26 and 50; and in poor condition if the percentage is 25 or less.

A range site in excellent condition is at or near its maximum productivity. Its plant cover adequately protects the soil and improves water intake and soil fertility.

A site in good condition has lost a few decreaser plants, but it is still productive and can be maintained and improved by good management of grazing.

A site in fair condition has a severely altered plant community in which increasers dominate and invaders are becoming prominent. Generally, the amount of litter is inadequate for protection against compaction and erosion. Brush control and deferred grazing are needed.

A site in poor condition has lost almost all of the desirable forage plants, has but few plants that are part of the original vegetation, and has many invaders.

Recognizing changes in the plant cover is one of the most important factors in good range management. Often the changes are overlooked or misunderstood. Growth following heavy rainfall, for example, may appear to improve the condition of the site when actually the cover is weedy and productivity is declining.

Descriptions of Range Sites

Two range sites are recognized in Howard County. They do not include all the soils of the county but only those used mainly as native range. Each site description includes estimates of total herbage yield, one for favorable years, and one for unfavorable years, when the site is in excellent condition. These estimates represent total air-dried herbage clipped at ground level from random plots. The amount of usable forage or of mowed hay is considerably less. After a year or two of favorable rainfall, the total production is likely to be more than the higher estimate, and after a drought, it is likely to be less than the lower estimate.

Black Clay Prairie range site

Sumter-Oktibbeha association, rolling, and Terouge clay, 1 to 3 percent slopes, are the only soils on this site.

The soils on this site are somewhat poorly drained and well drained, and permeability is slow or very slow. The root zone is moderately deep to deep, and the available water capacity is moderate to high. These calcareous soils have a surface layer of clay, and below this is clay or silty clay.

In excellent condition, this site produces large amounts of big bluestem, little bluestem, switchgrass,

indiangrass, compassplant, prairie clover, and native lespedezas. As the condition of the site deteriorates, compassplant, prairie acacia, prairie clover, dropseeds, and silver bluestem increase and dominate the plant community. Further deterioration reduces the palatable forbs and legumes. Then annuals increase or invade the site along with osage-orange (bois d'arc), hawthorn, persimmon, redcedar, and other woody plants.

If this site is in excellent condition, the estimated annual yield per acre of air-dry herbage ranges from about 6,000 pounds in years of favorable rainfall to about 4,400 pounds in years of unfavorable rainfall.

Chalky Ridge range site

The only soil in this site is Demopolis silty clay, 3 to 12 percent slopes, severely eroded. This soil is well drained and is slowly permeable. The root zone is shallow, and the available water capacity is low. This soil is calcareous silty clay overlying chalk.

In excellent condition, this site produces moderate amounts of little bluestem, indiangrass, side-oats grama, Virginia wildrye, compassplant, prairie clover, and sensitivebrier. As the condition of the site deteriorates, side-oats grama, compassplant, prairie acacia, dropseeds, and silver bluestem increase and dominate the plant community. Further deterioration reduces the palatable forbs and legumes, and annuals increase or invade the site along with such woody plants as osage-orange (bois d'arc), hawthorn, persimmon, and redcedar.

If this site is in excellent condition, the estimated annual yield per acre of air-dry herbage ranges from about 4,000 pounds in favorable years to about 2,500 pounds in unfavorable years.

Use of the Soils for Wildlife[6]

The kinds of fish and wildlife as well as their abundance are determined by the vegetation that the soil supports, the food that the vegetation provides, and the water. The kinds of vegetation as well as the amounts are closely related to soil features and to land use. Among the related soil features are fertility, slope, restrictive layers, structure, wetness, and the hazard of erosion.

Soils that support extensive forests, such as the forests in Howard County, provide excellent habitat for deer, wild turkey, bear, squirrel, waterfowl, and many songbirds. For these wildlife, this habitat provides suitable food, water, and cover. The forest is also sparsely populated, and the wildlife are not excessively disturbed.

The suitability of soils for ponds and reservoirs is determined by their water holding qualities. The fertility of the impounded water is directly related to the fertility of the soil.

Wildlife habitats can be managed by planting certain choice food plants, by managing existing vegetation, and by developing water where water is scarce. Information about the soils is useful for these purposes and provides a basis for planning multiple-use management. It also helps determine the specific sites for development, protection, and improvement of habitat elements. Present vegetation reflects past land use and may be a false criterion in judging potential for development for wildlife food and habitat.

In table 5 on page 42, the suitability of soils for eight elements of widlife habitat and three classes of wildlife are given. These ratings apply to the establishment, improvement, and maintenance of habitat, but they do not take into account the present use of the soil, the distribution of wildlife, or the distribution of the human population. The suitability of a specific site must be determined by onsite inspection.

In table 5, a rating of well suited indicates that habitats generally are easily created, improved, or maintained; that the soil has few or no limitations that affect management; and that satisfactory results can be expected.

Suited indicates that habitats can be created, improved, or maintained in most places; that the soil has moderate limitations that affect management; and that moderate intensity of management may be required for satisfactory results.

Poorly suited indicates that habitats can be created, improved, or maintained in most places; that the soil has severe limitations; that habitat management is difficult and expensive; and that results are not always satisfactory.

Unsuited indicates that it is impractical or impossible to create or maintain habitats, and that unsatisfactory results are probable.

Grain and seed crops refer to such annual crop plants as wheat, corn, sorghums, oats, cowpeas, and soybeans.

Grasses and legumes refer to such domestic grasses and legumes as bermudagrass, tall fescue, bahiagrass, ryegrass, clovers, annual lespedezas, and bush lespedezas.

Wild herbaceous plants refer to native or introduced perennials, such as tickclover, perennial lespedezas, wild beans, pokeberry, panicgrasses, croton (goatweed), and partridgepeas.

Hardwood woody plants refer to such trees, shrubs, and woody vines as oaks, cherries, mulberries, dogwoods, viburnums, maples, blueberries, honeysuckles, hickories, greenbriers, roses, and wild grapes.

Low-growing coniferous woody plants are cone-bearing trees and shrubs that are used mainly as cover but may furnish food in the form of browse, seeds, or fruitlike cones. They may be established naturally or by planting. Among them are pines, junipers, cedars, and ornamentals. The best soils are those that produce slow-growing plants that have branches close to the ground. Good sites for growing pine commercially are poorly suited to low-growing coniferous woody plants.

Among wetland food and cover plants are smartweed, wild millet, spikerush, sedges, cattail, and rice cutgrass.

Shallow water developments are impoundments, excavations, or other water-control structures, generally not exceeding 6 feet in depth, that are used to create habitat principally for waterfowl. They can be

[6] ROY A. GRIZZELL, JR., biologist, Soil Conservation Service, helped prepare this section.

designed to be drained and planted to crops, or they can be permanent impoundments.

Ponds and reservoirs are in areas suitable for developing water of suitable depth, quantity, and quality to produce fish and wildlife. These areas are suitable for impoundments, levees, and dugouts.

The three kinds of wildlife listed in table 5 are defined as follows:

Openland wildlife are quail, doves, cottontail rabbit, fox, meadowlark, field sparrow, and other birds and mammals that normally live on cropland, pastures, meadows, lawns, and in other openland areas where grasses, herbs, and shrubby plants grow.

Woodland wildlife are woodcock, thrush, vireo, deer, turkey, squirrel, raccoon, and other birds and mammals that normally live in wooded areas where trees and shrubs are dominant.

Wetland wildlife are ducks, geese, rail, herons, shore birds, otter, mink, muskrat, beaver, and other birds and mammals that normally live in wet areas, marshes, and swamps.

Use of the Soils for Engineering[7]

This section provides information of special interest to engineers, contractors, farmers, and others who use soil as structural material or as foundation material upon which structures are built. Among the soil properties most important in engineering are permeability, compressibility, shear strength, density, shrink-swell potential, available water capacity, grain-size distribution, plasticity, and reaction. These properties affect construction and maintenance of roads and airports, pipelines, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems.

Information concerning these and related soil properties is given in tables 6, 7, and 8. The estimates and interpretations of soil properties in these tables can be used in—

1. Planning and designing agricultural drainage systems, farm ponds, irrigation systems, diversion terraces, and other structures for controlling water and conserving soil.
2. Selecting potential locations for highways, airports, pipelines, and underground cables.
3. Locating probable sources of sand or gravel suitable for use as construction material.
4. Selecting potential industrial, commercial, residential, and recreational areas.

This information, however, does not eliminate the need for further investigations at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths greater than 6 feet. Also, inspection of sites, especially the small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some terms used by soil scientists may be unfamiliar to engineers, and some words have different meanings in soil science than they have in engineering. Among the terms that have special meaning in soil science are sand, silt, clay, surface soil, subsoil, and horizon. These and other terms are defined in the Glossary at the back of this survey.

Engineering Classification Systems

The two most commonly used systems in classifying soils for engineering purposes are the AASHO (*1*) system adopted by the American Association of State Highway Officials and the Unified Soil Classification System (*15*) used by the Soil Conservation Service, Department of Defense, and others.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A-7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A-1, A-2, and A-7 groups are divided as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHO classification for tested soils, with group index numbers in parentheses, is shown in table 8; the estimated classification, without group index numbers, is given in table 6 for all soils mapped in the survey area.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CH-MH.

Soil Properties Significant in Engineering

Several estimated soil properties significant in engineering are given in table 6. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 6.

[7] WALTER K. TWITTY, JR., civil engineer, Soil Conservation Service, helped prepare this section.

TABLE 5.—*Suitability of the soils for elements*

Soil	Elements of wildlife habitat		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants
Adaton silt loam	Suited	Suited	Suited
Angie silt loam, 1 to 3 percent slopes	Well suited	Well suited	Well suited
Angie silt loam, 3 to 8 percent slopes	Suited	Well suited	Well suited
Blevins loam, 1 to 3 percent slopes	Well suited	Well suited	Well suited
Blevins loam, 3 to 8 percent slopes	Suited	Well suited	Well suited
Cane fine sandy loam, 3 to 8 percent slopes	Suited	Well suited	Well suited
Demopolis silty clay, 3 to 12 percent slopes, severely eroded	Unsuited	Poorly suited	Suited
Greenville loam, 3 to 8 percent slopes	Suited	Well suited	Well suited
Kaufman clay	Suited [1]	Suited	Suited
Leeper silty clay	Suited [1]	Suited	Suited
Luverne fine sandy loam, 8 to 20 percent slopes	Poorly suited	Suited	Well suited
Marietta silt loam, silty subsoil variant	Suited [1]	Well suited	Well suited
Millwood fine sandy loam, 3 to 8 percent slopes	Suited	Well suited	Well suited
Millwood fine sandy loam, 8 to 12 percent slopes	Poorly suited	Suited	Well suited
Muskogee silt loam, 1 to 3 percent slopes	Well suited	Well suited	Well suited
Oktibbeha clay, 3 to 8 percent slopes, eroded	Suited	Suited	Suited
Oktibbeha clay, 8 to 12 percent slopes, eroded	Poorly suited	Suited	Suited
Ozan fine sandy loam	Suited	Suited	Suited
Pickens soils, 3 to 12 percent slopes	Poorly suited	Poorly suited	Suited
Pickens-Sherwood-Rock land association, hilly:			
Pickens soil	Unsuited	Unsuited	Suited
Sherwood soil	Unsuited	Unsuited	Well suited
Rock land	Unsuited	Unsuited	Poorly suited
Pirum fine sandy loam, 3 to 8 percent slopes	Suited	Suited	Well suited
Pirum-Pickens association, undulating:			
Pirum soil	Suited	Suited	Well suited
Pickens soil	Poorly suited	Poorly suited	Suited
Pirum-Sherwood association, undulating:			
Pirum soil	Suited	Suited	Well suited
Sherwood soil	Suited	Suited	Well suited
Ruston fine sandy loam, 1 to 3 percent slopes	Well suited	Well suited	Well suited
Ruston fine sandy loam, 3 to 8 percent slopes	Suited	Well suited	Well suited
Sacul fine sandy loam, 1 to 3 percent slopes	Suited	Well suited	Well suited
Sacul fine sandy loam, 3 to 8 percent slopes	Suited	Well suited	Well suited
Sacul fine sandy loam, 8 to 12 percent slopes	Poorly suited	Suited	Well suited
Saffell gravelly sandy loam, 1 to 3 percent slopes	Suited	Suited	Suited
Saffel gravelly sandy loam, 3 to 8 percent slopes	Suited	Suited	Suited
Saffell gravelly sandy loam, 8 to 20 percent slopes	Poorly suited	Suited	Suited
Savannah fine sandy loam, 1 to 3 percent slopes	Well suited	Well suited	Well suited
Savannah fine sandy loam, 3 to 8 percent slopes	Suited	Well suited	Well suited
Sherwood fine sandy loam, 3 to 8 percent slopes	Suited	Suited	Well suited
Sherwood fine sandy loam, 8 to 12 percent slopes	Poorly suited	Suited	Well suited
Sherwood-Pickens association, rolling:			
Sherwood soil	Unsuited	Suited	Well suited
Pickens soil	Unsuited	Poorly suited	Suited
Sumter clay, 3 to 12 percent slopes, eroded	Suited	Suited	Suited
Sumter-Oktibbeha association, rolling:			
Sumter soil	Unsuited	Suited	Suited
Oktibbeha soil	Unsuited	Suited	Suited
Terouge clay, 0 to 1 percent slopes	Suited [1]	Suited	Suited
Terouge clay, 1 to 3 percent slopes	Suited	Suited	Suited
Tiak soils, 8 to 20 percent slopes	Unsuited	Suited	Well suited
Toine loam	Suited [1]	Well suited	Well suited

[1] Poorly suited in frequently flooded areas.

of wildlife habitat and kinds of wildlife

Elements of wildlife habitat—Continued					Kinds of wildlife		
Hardwood woody plants	Low-growing coniferous woody plants	Wetland food and cover plants	Shallow water developments	Ponds and reservoirs	Openland	Woodland	Wetland
Well suited	Poorly suited	Well suited	Well suited	Well suited	Suited	Well suited	Well suited.
Well suited	Poorly suited	Poorly suited	Poorly suited	Well suited	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Unsuited	Unsuited	Well suited	Well suited	Wells uited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Poorly suited	Suited	Unsuited	Unsuited	Poorly suited	Suited	Suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Suited	Suited [1]	Well suited [1]	Suited	Well suited	Suited.
Well suited	Poorly suited	Suited	Suited [1]	Well suited [1]	Suited	Well suited	Suited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Poorly suited	Poorly suited	Suited [1]	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Unsuited	Unsuited	Well suited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Well suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Poorly suited	Suited	Well suited	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Well suited	Well suited	Well suited	Suited	Well suited	Well suited.
Suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Poorly suited	Suited	Unsuited.
Suited	Poorly suited	Unsuited	Unsuited	Unsuited	Unsuited	Suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Unsuited	Unsuited	Well suited	Unsuited.
Poorly suited	Suited	Unsuited	Unsuited	Unsuited	Unsuited	Poorly suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Poorly suited	Poorly suited	Well suited	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Unsuited	Unsuited	Well suited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Well suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Well suited	Poorly suited	Poorly suited	Poorly suited	Suited	Well suited	Well suited	Poorly suited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Well suited	Unsuited.
Suited	Poorly suited	Unsuited	Unsuited	Poorly suited	Poorly suited	Suited	Unsuited.
Suited	Suited	Unsuited	Unsuited	Poorly suited	Suited	Suited	Unsuited.
Suited	Suited	Unsuited	Unsuited	Poorly suited	Suited	Suited	Unsuited.
Well suited	Poorly suited	Unsuited	Unsuited	Suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Suited	Suited [1]	Well suited [1]	Suited	Well suited	Suited.
Suited	Poorly suited	Poorly suited	Suited	Well suited	Suited	Suited	Poorly suited.
Well suited	Poorly suited	Unsuited	Unsuited	Well suited	Suited	Well suited	Unsuited.
Well suited	Poorly suited	Unsuited	Poorly suited	Poorly suited	Well suited	Well suited	Unsuited.

Depth to bedrock is distance from the surface of the soil to the upper surface of the rock layer.

Depth to seasonal high water table is distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Soil texture is described in table 6 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this soil survey.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 6 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is the relative change in volume of soil material to be expected with changes in moisture content, that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. The extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material that has this rating.

Engineering Interpretations of Soils

The estimated interpretations in table 7 are based on the engineering properties of soils shown in table 6, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Howard County. In table 7, ratings are used to summarize the limitations or the suitability of the soils for all listed purposes other than ponds and reservoirs, embankments, and terraces and diversions. For these particular uses, table 7 lists those soil features not to be overlooked in planning, installation, and maintenance.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as for preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability, but also considered in the ratings is damage that results at the area from which topsoil is taken.

Road fill is soil material used in embankments for roads. The suitability ratings reflect (1) the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage, and (2) the relative ease of excavating the material at borrow areas.

Highway location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. The soil features, favorable as well as unfavorable, are the principal ones that affect geographic location of highways.

Winter grading is affected chiefly by soil features, especially unfavorable ones, that are relevant to moving, mixing, and compacting soil in road building when temperatures are below freezing or when the soil material is wet.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Farm pond embankments require soil material resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among factors that are unfavorable.

Terraces and diversions are embankments or ridges constructed across the slope to intercept runoff so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity of slope and steepness; depth to bedrock or other unfavorable material; presence of stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

Grassed waterways are affected by those features and qualities of soils that affect the establishment, growth, and maintenance of plants and factors that hinder layout and construction.

Engineering Test Data

Table 8 contains engineering test data for some of the major soil series in Howard County. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications given are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods.

Moisture-density data are important in earthwork. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the *optimum moisture content* is reached. After that, density decreases with increase in moisture content. The highest dry density obtained in the compactive test is termed *maximum dry density*.

As a rule, maximum strength of earthwork is obtained if the soil is compacted to the maximum dry density.

Mechanical analyses show the percentages, by weight, of soil particles that would pass sieves of specified sizes. Sand and other coarser materials do not pass through the No. 200 sieve. Silt and clay pass through the No. 200 sieve. Silt is that material larger than 0.002 millimeter in diameter that passes through the No. 200 sieve, and clay is that fraction passing through the No. 200 sieve that is smaller than 0.002 millimeter in diameter.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic. If the moisture content is further increased, the material changes from a plastic to a liquid. The plastic limit is the moisture content at which the soil material changes from a semisolid to a plastic; and the liquid limit, from a plastic to a liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Other Engineering Materials

In the Ouachita Mountains area in the northern part of Howard County, sandstone or shale bedrock is near the surface and should be considered in construction work. In the central and southern parts of the county are blacklands where the soils are high in expanding clay and are underlain by chalk, generally at depths of from 1 to 5 feet.

The Saffell soils have a variable but high content of waterworn gravel that is fairly well graded and ranges in size from about one-fourth inch to 3 inches in diameter. The gravelly layers vary in thickness from about 3 feet to more than 10 feet. Some of these areas have been surface mined for road fill and road surfacing material. Few, if any, of the gravel deposits are clean enough or properly graded for use as building aggregate without washing and screening.

Bedrock beneath the Pickens soils is a good source of shale.

The chalk beds underlying Demopolis soils are a good source of chalk. Some areas are presently being mined and the chalk is used in manufacturing portland cement.

In most areas of the Oktibbeha and Sumter soils, the underlying chalk is interbedded with high-grade gypsum beds.

Most of the soils of Howard County have some limitations as construction or foundation materials; many of these limitations can be overcome with appropriate treatment.

Use of the Soils for Town and Country Planning

Table 9 on page 60 gives the degree and kind of limitations of the soils of Howard County for selected nonfarm uses The degrees of limitation reflect all the features of the given soil that affect a particular use. These ratings apply to a depth of 6 feet, or less if the depth is to bedrock. Slight means that soils have properties favorable for the specified use, and limitations are so minor that they can easily be overcome; good performance and low maintenance can be expected from the soils. Moderate means that the soils have properties moderately favorable for the specified use, and that the limitations can be overcome or modified with planning, design, or special maintenance. Severe means that the soils have one or more properties unfavorable for the rated use, and that the limitations are difficult and costly to modify or overcome; major soil reclamation, special design, or intensive maintenance is required.

The soil map and the information in table 9 are useful as guides for evaluating areas for the specific uses, but detailed onsite investigations are needed for final evaluation. This is because as much as 15 percent of an area designated on the map as a specific soil may consist of spots of other soils. Soil associations may also have component soils that differ widely in suitability for a specific use.

Additional information that may be helpful in town and country planning can be found in the section "Use of the Soils in Engineering."

Following are explanations of some of the columns in table 9. Engineers and others should not apply specific values to the estimates given for bearing strength of soils in some columns.

Dwellings, as rated in table 9, are not more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to capacity to support load and resist settlement under load, and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, shrink-swell potential (fig. 12 on page 58), and bearing strength. The ratings for bearing strength are based on estimates of the maximum load that a soil can support when compacted. Soil properties that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Septic tank filter fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil. The soil material from a depth of 18 inches to 6 feet is evaluated. The soil properties considered are those that affect both absorption of effluent and construction and operation of the system.

Properties that affect absorption are permeability, depth to water table or rock, and susceptibility to flooding. A percolation rate of more than 75 minutes per inch or permeability of less than 0.63 inch per hour is a severe limitation, but a percolation rate of between 45 and 75 minutes per inch or permeability between 0.63 and 1 inch per hour is a moderate limitation. A seasonal water table that is less than 4 feet below the surface is a severe limitation.

TABLE 6.— *Soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. the instructions for referring to other series that appear in the first column of

Soil series and map symbols	Approximate depth to—		Depth from surface (typical profile)	Classification	
	Bedrock	Seasonal high water table		USDA texture	Unified
	Feet	*Feet*	*Inches*		
Adaton: Ad	>6	0–1	0–6	Silt loam	ML or CL
			6–60	Silty clay loam	CL
			60–72	Silty clay	CL or CH
Angie: AnB, AnC	>6	1–2	0–7	Silt loam	ML or CL
			7–16	Silty clay loam	CL
			16–56	Silty clay	CL or CH
			56–72	Clay	CL or CH
Blevins: BlB, BlC	>6	4–6	0–7	Loam	ML
			7–16	Silt loam	ML
			16–45	Loam	ML or CL
			45–54	Silt loam	ML or CL
			54–72	Loam	ML or CL
Cane: CaC	>6	2–3	0–4	Fine sandy loam	SM
			4–14	Loam	ML
			14–24	Clay loam	CL
			24–72	Clay loam	CL
Demopolis: DeD3	0.5–1.5	>6	0–13	Silty clay	CH or MH
Greenville: GrC	>6	>6	0–7	Loam	ML or CL
			7–72	Clay and silty clay	CL or CH
Kaufman: Ka	>6	0.5–1	0–72	Clay	CL, CL-CH, or CH
Leeper: Le	>6	0.5–1	0–14	Silty clay	CH
			14–72	Clay	CH
Luverne: LuE	>6	>6	0–8	Fine sandy loam	SM
			8–26	Sandy clay	SC, CL, or CH
			26–72	Sandy clay loam or fine sandy loam	SC or SM
Marietta: Ma	>6	1.5–2.5	0–5	Silt loam	ML or CL
			5–30	Loam	ML or CL
			30–45	Silt loam	ML or CL
			45–72	Silty clay loam	CL
Millwood: MlC, MlD	>6	2–3	0–7	Fine sandy loam	ML or SM
			7–72	Clay	CH
Muskogee: MuB	>6	1.5–2.5	0–12	Silt loam	ML or CL
			12–24	Silty clay loam	CL or CH
			24–43	Silty clay	CH
			43–72	Clay	CH
Oktibbeha: OkC2, OkD2	3–5	1.5–2.5	0–5	Clay	CH, CH-MH, or MH
			5–33	Clay	CH orMH
			33–42	Clay	CH or MH
			42–51	Clay	CH, CH–MH, or MH
Ozan: On	>6	0–0.5	0–15	Fine sandy loam	ML
			15–72	Loam	ML or CL
*Pickens: PcD, PkE For Sherwood part of PkE, see Sherwood series. Properties of Rock land in PkE are too variable to be estimated.	1–1.5	>6	0–12	Shaly fine sandy loam	GM, SM, or ML

significant in engineering

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully this table. The symbol > means more than; the symbol < means less than]

Classification—Con.	Coarse fraction greater than 3 inches	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
AASHO		No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
	Percent					*Inches per hour*	*Inches per inch of soil*	*pH value*	
A–4 or A–6			100	95–100	75–90	0.63–2.0	0.20–0.22	4.5–6.0	Low.
A–6			100	95–100	80–95	0.06–0.20	0.19–0.21	4.0–5.5	Low.
A–7			100	95–100	85–95	0.06–0.20	0.17–0.19	4.0–5.5	Moderate.
A–4 or A–6		95–100	95–100	85–100	70–90	0.63–2.0	0.20–0.22	5.1–6.0	Low.
A–6			100	90–100	75–90	0.20–0.63	0.19–0.21	4.0–5.5	Low to moderate.
A–7			100	90–100	75–95	0.06–0.20	0.17–0.20	4.0–5.5	Moderate.
A–7			100	90–100	80–95	0.06–0.20	0.17–0.20	4.0–5.5	Moderate.
A–4 or A–6		95–100	95–100	95–100	65–80	0.63–2.0	0.16–0.18	4.5–6.0	Low.
A–4 or A–6		95–100	95–100	95–100	70–90	0.63–2.0	0.20–0.22	4.5–6.0	Low.
A–4 or A–6		95–100	95–100	95–100	75–95	0.63–2.0	0.16–0.18	4.0–5.5	Low.
A–4 or A–6		95–100	95–100	95–100	80–95	0.63–2.0	0.20–0.22	4.0–5.5	Low.
A–4 or A–6		95–100	95–100	95–100	70–90	0.63–2.0	0.16–0.18	4.0–5.5	Low.
A–2 or A–4		95–100	95–100	90–95	30–45	0.63–2.0	0.13–0.16	4.5–6.0	Low.
A–4		95–100	95–100	90–100	55–75	0.63–2.0	0.16–0.18	4.5–6.0	Low.
A–4 or A–6		95–100	95–100	90–100	55–75	0.20–0.63	0.15–0.17	4.5–5.5	Low.
A–4 or A–6		95–100	95–100	90–100	60–80	0.06–0.20	0.10–0.13	4.5–5.5	Low.
A–7	0–10	80–100	80–100	80–100	80–100	0.06–0.20	0.12–0.16	7.9–8.4	High.
A–4		90–100	90–100	75–90	55–75	0.63–2.0	0.16–0.18	5.6–7.3	Low.
A–7		95–100	95–100	90–100	85–100	0.20–0.63	0.17–0.19	4.0–5.5	Moderate.
A–7			100	90–100	85–95	<0.06	0.17–0.19	6.1–7.8	High.
A–7			100	95–100	90–95	0.06–0.20	0.17–0.19	6.1–8.4	High.
A–7			100	95–100	90–95	<0.06	0.17–0.19	6.6–8.4	High.
A–2 or A–4		95–100	85–100	65–75	25–15	0.63–2.0	0.13–0.16	4.5–6.5	Low.
A–6 or A–7		95–100	95–100	65–75	45–75	0.20–0.63	0.15–0.17	4.5–5.5	Low to moderate.
A–2 or A–4		95–100	95–100	75–95	35–45	0.20–0.63	0.13–0.18	4.5–5.5	Low.
A–4 or A–6			100	95–100	80–95	0.63–2.0	0.20–0.22	6.1–8.4	Low.
A–4 or A–6			100	95–100	80–95	0.63–2.0	0.16–0.18	6.1–8.4	Low.
A–4 or A–6			100	95–100	80–95	0.63–2.0	0.20–0.22	6.1–8.4	Low.
A–6		85–100	85–100	85–100	80–95	0.63–2.0	0.19–0.21	6.1–8.4	Low to moderate.
A–4		95–100	95–100	90–100	45–75	0.63–2.0	0.13–0.16	5.1–6.0	Low.
A–7		95–100	95–100	95–100	85–100	0.06–0.20	0.17–0.19	4.5–5.5	High.
A–4 or A–6		100	95–100	95–100	75–95	0.20–0.63	0.20–0.22	4.5–6.0	Low.
A–6 or A–7		100	95–100	95–100	85–100	0.06–0.20	0.19–0.21	4.5–5.5	Moderate.
A–7			100	95–100	90–100	0.06–0.20	0.17–0.19	4.5–5.5	High.
A–7			100	95–100	90–100	0.06–0.20	0.17–0.19	4.5–5.5	High.
A–7			100	90–100	90–100	0.06–0.20	0.19–0.21	5.1–7.8	High.
A–7			100	95–100	95–100	0.06	0.19–0.21	4.5–5.5	High.
A–7			100	95–100	95–100	0.06	0.19–0.21	5.6–8.4	High.
A–7		95–100	95–100	95–100	95–100	0.06	0.19–0.21	7.9–8.4	High.
A–4		100	95–100	95–100	60–75	0.20–0.63	0.13–0.16	4.5–6.0	Low.
A–4		100	95–100	95–100	55–80	0.06–0.20	0.16–0.18	4.5–5.5	Low.
A–2 or A–4	0–15	60–90	60–85	60–85	35–55	0.63–2.0	0.10–0.14	4.0–6.0	Low.

TABLE 6.—*Soil properties significant*

Soil series and map symbols	Approximate depth to—		Depth from surface (typical profile)	Classification	
	Bedrock	Seasonal high water table		USDA texture	Unified
	Feet	*Feet*	*Inches*		
*Pirum: PmC, PpB, PsB For Pickens part of PpB, see Pickens series; for Sherwood part of PsB, see Sherwood series.	2–3.5	>6	0–11 11–36	Fine sandy loam Sandy clay loam	SM or ML CL, CL-ML, or SC
Rock land. Mapped only in an association with Pickens and Sherwood soils. Properties too variable to be estimated.					
Ruston: RuB, RuC	>6	>6	0–6 6–40 40–72	Fine sandy loam Loam Fine sandy loam	SM or ML SC, ML, or CL SM or ML
Sacul: SaB, SaC, SaD	>6	2–3	0–5 5–13 13–30 30–42 42–59 59–72	Fine sandy loam Silt loam Silty clay Clay loam Loam Silt loam	ML ML CL or CH CL ML or CL ML
Saffell: SeB, SeC, SeE	>6	>6	0–8 8–47 47–72	Gravelly sandy loam Gravelly sandy clay loam Gravelly sandy loam	GM or SM GM or GC GM
Savannah: SfB, SfC	>6	2–3	0–9 9–20 20–35 35–58 58–72	Fine sandy loam Loam Clay loam Clay loam Sandy clay loam	ML ML or ML-CL CL CL SC or CL
*Sherwood: ShC, ShD, SkD For Pickens part of SkD, see Pickens series.	2–4	>6	0–9 9–37	Fine sandy loam Sandy clay loam	SM or ML SC or CL
*Sumter: SmD2, SoD For Oktibbeha part of SoD, see Oktibbeha series.	2–4	>6	0–29	Clay, silty clay	CH, CH-MH, or MH
Terouge: TeA, TeB	>6	0–0.5	0–72	Clay	MH or MH-CH
Tiak: TkE	>6	1–2	0–5 5–72	Fine sandy loam Silty clay and clay	ML CH or MH
Toine: To	>6	3–5	0–7 7–13 13–55 55–72	Loam Fine sandy loam Sandy clay loam Fine sandy loam	ML SM, CL-ML, or ML SC, CL-ML, or CL SM, CL-ML, or ML

in engineering—Continued

Classification—Con.	Coarse fraction greater than 3 inches	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential
AASHO		No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
	Percent					*Inches per hour*	*Inches per inch of soil*	*pH value*	
A–2 or A–4	0–5	95–100	95–100	85–100	35–55	0.63–2.0	0.13–0.16	5.1–6.0	Low.
A–4	0–5	95–100	95–100	85–100	45–65	0.63–2.0	0.15–0.18	4.5–5.5	Low.
A–4		90–100	90–100	80–95	40–60	0.63–2.0	0.13–0.16	5.1–6.0	Low.
A–4 or A–6		90–100	90–100	85–95	45–70	0.63–2.0	0.16–0.18	4.5–5.5	Low.
A–2 or A–4		90–100	90–100	80–95	30–55	0.63–2.0	0.13–0.16	4.5–5.5	Low.
A–4		95–100	95–100	95–100	60–75	0.63–2.0	0.13–0.16	5.1–6.0	Low.
A–4		95–100	95–100	95–100	70–90	0.20–0.63	0.20–0.22	5.1–6.0	Low.
A–7		95–100	95–100	95–100	80–95	0.06–0.20	0.17–0.19	4.5–5.5	Moderate to high.
A–6 or A–7		95–100	95–100	95–100	70–90	0.20–0.63	0.15–0.17	4.5–5.5	Low to moderate.
A–4 or A–6		95–100	95–100	95–100	70–90	0.20–0.63	0.16–0.18	4.5–5.5	Low.
A–4		95–100	95–100	95–100	70–90	0.20–0.63	0.10–0.15	4.0–5.0	Low.
A–1, A–2, or A–4	0–5	60–80	60–75	45–70	20–45	2.0–6.3	0.08–0.12	5.1–6.0	Low.
A–1, A–2, or A–4	0–5	35–65	30–60	30–50	20–45	2.0–6.3	0.10–0.12	4.5–5.5	Low.
A–1 or A–2	0–5	35–65	30–60	30–50	15–30	2.0–6.3	0.08–0.10	4.5–5.5	Low.
A–4		95–100	95–100	90–100	55–75	0.63–2.0	0.13–0.16	5.1–6.0	Low.
A–4		95–100	95–100	95–100	60–80	0.63–2.0	0.16–0.18	4.5–5.5	Low.
A–6		95–100	95–100	95–100	65–85	0.63–2.0	0.15–0.17	4.5–5.5	Low.
A–6		95–100	95–100	95–100	60–80	0.20–0.63	0.10–0.12	4.5–5.5	Low.
A–4 or A–6		95–100	95–100	95–100	45–65	0.20–0.63	0.15–0.18	4.5–5.5	Low.
A–2 or A–4	0–20	75–100	75–100	80–95	25–55	0.63–2.0	0.12–0.15	4.5–6.0	Low.
A–4 or A–6	0–20	75–100	75–100	80–95	40–60	0.63–2.0	0.12–0.18	4.5–5.5	Low.
A–7	0–5		100	95–100	90–100	0.06–0.20	0.17–0.19	7.9–8.4	High.
A–7		100	95–100	95–100	85–100	0.06	0.17–0.19	7.4–8.5	High.
A–4		90–100	90–100	85–100	70–90	0.63–2.0	0.13–0.16	5.1–6.0	Low.
A–7		95–100	95–100	95–100	90–100	0.06–0.20	0.17–0.19	4.5–5.5	High.
A–4		95–100	95–100	90–100	75–90	0.63–2.0	0.16–0.18	5.1–6.5	Low.
A–4		95–100	95–100	90–100	45–70	0.63–2.0	0.13–0.16	5.1–6.5	Low.
A–4		95–100	95–100	90–100	45–70	0.63–2.0	0.13–0.16	4.6–5.5	Low.
A–4		95–100	95–100	90–100	45–70	0.63–2.0			

TABLE 7.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. the instructions for referring to other series

Soil series and map symbols	Suitability as a source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Adaton: Ad	Poor: poorly drained	Poor: moderate to low traffic-supporting capacity; poorly drained.	Moderate to low traffic-supporting capacity; seasonal high water table; some areas subject to flooding.
Angie: AnB, AnC	Poor: high content of clay below a depth of 7 inches; material below excavated depth somewhat difficult to reclaim.	Poor: low traffic-supporting capacity; moderate shrink-swell potential; less than 2 feet of suitable material.	Low traffic-supporting capacity; moderate shrink-swell potential; seasonal high water table; cut and fill excessive where slopes are more than 6 percent.
Blevins: BlB, BlC	Good	Fair: moderate traffic-supporting capacity.	Moderate traffic-supporting capacity; cut and fill excessive where slopes are more than 6 percent.
Cane: CaC	Fair: moderate thickness of suitable material; material below excavated depth somewhat difficult to reclaim.	Fair: moderate traffic-supporting capacity.	Moderate traffic-supporting capacity; seasonal high water table; cut and fill excessive where slopes are more than 6 percent.
Demopolis: DeD3	Poor: clayey material; high content of coarse fragments; shallow to rippable chalk bedrock; material below excavated depth difficult or impossible to reclaim.	Poor: low traffic-supporting capacity; high shrink-swell potential; shallow to rippable chalk bedrock; material below excavated depth difficult or impossible to reclaim.	Low traffic-supporting capacity; high shrink-swell potential; shallow to rippable chalk bedrock; slopes are more than 8 percent; excessive cut and fill.
Greenville: GrC	Fair: friable, clayey material	Fair: moderate traffic-supporting capacity.	Moderate traffic-supporting capacity; cut and fill excessive where slopes are more than 6 percent.
Kaufman: Ka	Poor: clayey material; somewhat poorly drained.	Poor: low traffic-supporting capacity; high shrink-swell potential; somewhat poorly drained.	Low traffic-supporting capacity; high shrink-swell potential; seasonal high water table; subject to flooding.
Leeper: Le	Poor: clayey material; somewhat poorly drained.	Poor: low traffic-supporting capacity; high shrink-swell potential; somewhat poorly drained.	Low traffic-supporting capacity; high shrink-swell potential; seasonal high water table; subject to flooding.
Luverne: LuE	Fair: clayey subsoil	Fair to poor: moderate to low traffic-supporting capacity.	Moderate to low traffic-supporting capacity; slopes are more than 8 percent; excessive cut and fill.

interpretations of soils

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully that appear in the first column of this table]

Soil features affecting—Con.				
Winter grading	Farm ponds		Terraces and diversions	Grassed waterways
	Reservoir areas	Embankments		
Seasonal high water table; poorly drained; moderate to low traffic-supporting capacity; some areas subject to flooding.	Soil features generally favorable.	Fair to good slope stability; medium to high compressibility; good to fair resistance to piping and erosion.	Level soil	Soil features generally favorable; level soil.
Seasonal high water table; plastic, clayey material in subsoil.	Soil features generally favorable.	Fair slope stability; medium to high compressibility.	Erodible material; excessive slope in some areas.	Erodible material; excessive slope in some areas.
Soil features generally favorable.	Moderate permeability	Fair to good slope stability; medium to low permeability when compacted; medium compressibility; poor to fair resistance to piping and erosion.	Soil features generally favorable.	Soil features generally favorable.
Seasonal high water table	Soil features generally favorable.	Fair to good slope stability; medium compressibility; poor to fair resistance to piping and erosion.	Soil features generally favorable.	Soil features generally favorable.
Clayey material, plastic when wet; shallow to rippable chalk bedrock.	Shallow to rippable chalk bedrock.	Very limited borrow material; fair slope stability; high compressibility.	Shallow to rippable chalk bedrock; plastic, clayey soil that has high shrink-swell potential; difficult to construct and maintain; slopes excessive.	Erodible material; shallow to rippable chalk bedrock; low available water capacity; slopes excessive.
Material plastic when wet.	Moderately slow permeability.	Fair to good slope stability; medium to high compressibility; low permeability when compacted.	Soil features generally favorable.	Soil features generally favorable.
Seasonal high water table; somewhat poorly drained; plastic, clayey material; subject to flooding.	Soil features generally favorable.	Fair slope stability; high compressibility.	Level soil	Soil features generally favorable; level soil.
Seasonal high water table; somewhat poorly drained; plastic, clayey material; subject to flooding.	Soil features generally favorable.	Fair slope stability; high compressibility.	Level soil	Soil features generally favorable; level soil
Soil features generally favorable; moderately plastic at a depth of 8 to 26 inches from the surface when wet.	Moderately slow permeability.	Fair to good slope stability; medium to low permeability when compacted; poor to fair resistance to piping and erosion; medium compressibility.	Excessive slope	Excessive slope.

TABLE 7.—*Engineering interpretations*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Marietta: Ma	Fair: moderately well drained	Fair: moderate traffic-supporting capacity; moderately well drained.	Moderate traffic-supporting capacity; seasonal high water table; subject to flooding.
Millwood: MIC, MID	Poor: high content of clay below a depth of 7 inches.	Poor: low traffic-supporting capacity; moderate to high shrink-swell potential.	Low traffic-supporting capacity; high shrink-swell potential; cut and fill excessive where slopes are more than 6 percent.
Muskogee: MuB	Fair: high content of clay below a depth of 24 inches.	Fair to poor: low traffic-supporting capacity and high shrink-swell potential below a depth of 24 inches; 2 feet or less of suitable material.	Low traffic-supporting capacity and high shrink-swell potential below a depth of 24 inches; seasonal high water table.
Oktibbeha: OkC2, OkD2	Poor: clayey material	Poor: low traffic-supporting capacity; high shrink-swell potential; moderately deep to rippable chalk bedrock; material below excavated depth difficult or impossible to reclaim.	Low traffic-supporting capacity; high shrink-swell potential; cut and fill excessive where slopes are more than 6 percent; moderately deep to rippable chalk bedrock.
Ozan: On	Poor: poorly drained	Poor: moderate traffic-supporting capacity; poorly drained.	Moderate traffic-supporting capacity; seasonal high water table; most areas subject to flooding.
*Pickens: PcD, PkE For Sherwood part of PkE, see Sherwood series. No interpretations made for Rock land in PkE; properties too variable.	Poor: coarse fragments; shallow depth to bedrock; material below excavated depth difficult or impossible to reclaim.	Poor: shallow depth to bedrock of rippable shale; material below excavated depth difficult or impossible to reclaim.	Shallow to bedrock of rippable shale; slopes are more than 6 percent in most areas, and more than 15 percent in many areas; cut and fill excessive in most areas.
*Pirum: PmC, PpB, PsB For Pickens part of PpB, see Pickens series; for Sherwood part of PsB, see Sherwood series.	Fair to poor: moderately deep to sandstone bedrock; material below excavated depth difficult or impossible to reclaim; coarse fragments in the surface layer in some areas.	Fair to poor: moderate traffic-supporting capacity; moderately deep to sandstone bedrock; material below excavated depth difficult or impossible to reclaim.	Moderate traffic-supporting capacity; moderately deep to sandstone bedrock; difficult to excavate; cut and fill excessive where slopes are more than 6 percent.
Rock land. Mapped only in an association with Pickens and Sherwood soils. No interpretations made; properties to variable.			
Ruston: RuB, RuC	Good to fair: low fertility	Fair: moderate traffic-supporting capacity.	Moderate traffic-supporting capacity; cut and fill excessive where slopes are more than 6 percent.
Sacul: SaB, SaC, SaD	Fair to poor: shallow to clayey material.	Poor: low traffic-supporting capacity.	Low traffic-supporting capacity; moderate to high shrink-swell potential; cut and fill excessive where slopes are more than 6 percent.

of soils—Continued

Soil features affecting—Con.				
Winter grading	Farm ponds		Terraces and diversions	Grassed waterways
	Reservoir areas	Embankments		
Seasonal high water table; subject to flooding.	Moderate permeability	Fair to good slope stability; medium to low permeability when compacted; medium compressibility; fair to poor resistance to piping and erosion.	Level soil	Soil features generally favorable; level soil.
Material plastic when wet	Soil features generally favorable.	Fair slope stability; high compressibility.	Excessive slope in some areas; clayey subsoil makes construction difficult.	Soil features generally favorable; excessive slope in some areas.
Seasonal high water table; material below a depth of 24 inches is plastic when wet.	Soil features generally favorable.	Fair slope stability; medium to high compressibility.	Soil features generally favorable.	Soil features generally favorable.
Plastic, clayey material; seasonal high water table.	Soil features generally favorable; moderately deep over rippable chalk bedrock.	Fair slope stability; high compressibility; 3 to 5 feet of borrow material over rippable chalk bedrock.	Erodible, plastic, clayey material; high shrink-swell potential; difficult to construct and maintain; slope excessive in some areas.	Erodible material; slope excessive in some areas.
Seasonal high water table; poorly drained; most areas subject to flooding.	Soil features generally favorable.	Fair to good slope stability; medium compressibility; poor to fair resistance to piping and erosion.	Level soil	Soil features generally favorable; level soil.
Soil features generally favorable.	Shallow to bedrock of rippable shale; difficult to excavate.	Less than 2 feet of borrow material over rippable shale; difficult to compact for control of seepage and piping.	Shallow to bedrock; slope excessive in most areas.	Shallow depth to bedrock; slopes excessive in most areas; droughty; vegetation difficult to establish.
Soil features generally favorable.	Moderate permeability; moderately deep to sandstone bedrock; difficult to excavate.	Medium compressibility; fair resistance to piping and erosion; moderately deep to sandstone bedrock; 2 to 3.5 feet of borrow material.	Soil features generally favorable.	Soil features generally favorable.
Soil features generally favorable.	Moderate permeability	Fair slope stability; medium to low permeability when compacted; medium compressibility; fair resistance to piping and erosion.	Soil features generally favorable.	Soil features generally favorable.
Plastic, clayey subsoil; difficult to work when wet.	Soil features generally favorable.	Fair to good slope stability; medium to high compressibility.	Excessive slope in many places; clayey subsoil makes construction difficult; difficult to maintain.	Excessive slope in many places.

TABLE 7.—*Engineering interpretations*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Saffell: SeB, SeC, SeE	Poor: high content of gravel; low fertility; low available water capacity.	Good	Cut and fill excessive where slopes are more than 6 percent.
Savannah: SfB, SfC	Fair: moderate thickness of suitable material; material below excavated depth somewhat difficult to reclaim.	Fair: moderate traffic-supporting capacity.	Moderate traffic-supporting capacity; seasonal high water table; cut and fill excessive where slopes are more than 6 percent.
*Sherwood: ShC, ShD, SkD For Pickens part of SkD, see Pickens series.	Fair to poor: moderately deep to sandstone bedrock; material below excavated depth difficult or impossible to reclaim; coarse fragments in some areas.	Fair to poor: moderate traffic-supporting capacity; moderately deep to sandstone bedrock; material below excavated depth difficult or impossible to reclaim.	Moderate traffic-supporting capacity; moderately deep to sandstone bedrock; difficult to excavate; cut and fill excessive where slopes are more than 6 percent.
*Sumter: SmD2, SoD For Oktibbeha part of SoD, see Oktibbeha series.	Poor: clayey material; moderately deep to bedrock; material below excavated depth difficult or impossible to reclaim.	Poor: low traffic-supporting capacity; high shrink-swell potential; moderately deep over rippable chalk bedrock; material below excavated depth difficult or impossible to reclaim.	Low traffic-supporting capacity; high shrink-swell potential; cut and fill excessive where slopes are more than 6 percent; moderately deep to rippable chalk bedrock.
Terouge: TeA, TeB	Poor: clayey material; somewhat poorly drained.	Poor: low traffic-supporting capacity; high shrink-swell potential; somewhat poorly drained.	Low traffic-supporting capacity; high shrink-swell potential; seasonal high water table. TeA is subject to flooding.
Tiak: TkE	Poor: high content of clay below a depth of 5 inches; material below excavated depth somewhat difficult to reclaim.	Poor: low traffic-supporting capacity; moderate to high shrink-swell potential; less than 1 foot of suitable material.	Low traffic-supporting capacity: high shrink-swell potential; slopes are more than 8 percent; excessive cut and fill required.
Toine: To	Good	Fair: moderate traffic-supporting capacity.	Moderate traffic-supporting capacity; subject to flooding.

of soils—Continued

Soil features affecting—Con.				
Winter grading	Farm ponds		Terraces and diversions	Grassed waterways
	Reservoir areas	Embankments		
Soil features generally favorable.	Moderately rapid permeability.	Fair slope stability; medium to low permeability when compacted; poor to fair resistance to piping and erosion.	High gravel content; erodible; poor stability in low embankments; excessive slope in some areas.	High gravel content; low fertility; low available water capacity; excessive slope in some areas.
Seasonal high water table	Soil features generally favorable.	Fair to good slope stability; medium compressibility; poor to fair resistance to piping and erosion.	Soil features generally favorable.	Soil features generally favorable.
Soil features generally favorable.	Moderate permeability; moderately deep to sandstone bedrock; difficult to excavate.	Medium compressibility; fair resistance to piping and erosion; moderately deep to sandstone bedrock; 2 to 4 feet of borrow material.	Excessive slope in some areas.	Excessive slope in some areas.
Plastic, clayey material	Soil features generally favorable; moderately deep to rippable chalk bedrock.	Fair slope stability; high compressibility; 2 to 4 feet of borrow material over rippable chalk bedrock.	Erodible, plastic, clayey material; high shrink-swell potential; difficult to construct and maintain; excessive slope in most areas.	Erodible material; excessive slope in some areas.
Seasonal high water table; somewhat poorly drained; plastic, clayey material. TeA is subject to flooding.	Soil features generally favorable.	Fair slope stability; high compressibility.	Plastic, clayey material; high shrink-swell potential; difficult to construct and maintain. TeA is level.	Soil features generally favorable.
Clayey material; plastic when wet.	Soil features generally favorable.	Fair to good slope stability; medium to high compressibility.	Excessive slope	Excessive slope.
Soil features generally favorable; subject to flooding.	Moderately permeable	Fair to good slope stability; medium to low permeability when compacted; medium compressibility; poor to fair resistance to piping and erosion.	Level soil	Soil features generally favorable; level soil.

TABLE 8.—*Engineering*

[Tests performed by the Arkansas State Highway

Soil name and location	Parent material	Arkansas SCS report number S–68–Ark–31	Depth from surface
			In
Kaufman clay: SW¼SW¼ sec. 5, T. 11 S., R. 27 W. (Modal)	Clayey sediments on flood plains of the Blackland Prairie.	7–3 7–4 7–5	12–22 22–41 41–52
Oktibbeha clay: SW¼SE¼NE¼ sec. 34, T. 10 S., R. 27 W. (Modal)	Unconsolidated, clayey, fluvial or marine sediments on Blackland Prairie uplands.	6–2 6–3 6–4	5–12 12–19 19–29
Pirum fine sandy loam: NW¼SW¼NE¼ sec. 24, T. 6 S., R. 30 W. (Modal)	Sandstone and shale on Ouachita Mountain uplands.	3–3 3–4 3–5	11–16 16–30 30–36
Sumter clay: NE¼NE¼NE¼ sec. 34, T. 11 S., R. 27 W. (Modal)	Chalk and marly clay on Blackland Prairie uplands.	4–2 4–3 4–4	4–9 9–16 16–29
Terouge clay: NW¼SE¼SE¼ sec. 33, T. 11 S., R. 27 W. (Modal)	Clayey sediments on flood plains on the Blackland Prairie.	5–2 5–3 5–4	5–16 16–29 29–46
Toine loam: SW¼NE¼SE¼ sec. 26, T. 6 S., R. 29 W. (Modal)	Loamy sediments on flood plains and natural levees along drainageways on the Southern Coastal Plain and in the Ouachita Mountains.	2–4 2–5 2–6	22–37 37–52 52–63

[1] Based on AASHO Designation T–99, Method A *(1)*.

[2] Mechanical analyses according to the AASHO Designation T–88 *(1)*. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is

test data

Department, Division of Materials and Tests]

Moisture-density data [1]		Percentage passing sieve [2]			Liquid limit	Plasticity index	Classification	
Maximum dry density	Optimum moisture	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)			AASHO [3]	Unified [4]
Lb per cu ft	*Pct*				*Pct*			
100	23	100	99	86	49	28	A–7–6(25)	CL-CH
103	21	100	99	86	47	22	A–7–6(20)	CL
103	21	100	99	89	49	29	A–7–6(26)	CL-CH
91	29	----------	100	97	72	40	A–7–5(47)	CH or CH-MH
89	29	----------	100	97	60	22	A–7–5(29)	MH
95	26	----------	100	97	61	29	A–7–5(35)	MH-CH
118	13	100	98	56	24	7	A–4(3)	CL-ML
117	14	[5]99	98	58	27	9	A–4(3)	CL
120	12	100	98	56	23	5	A–4(3)	CL-ML
85	31	100	97	93	79	40	A–7–5(46)	MH or MH-CH
85	31	----------	100	98	84	50	A–7–5(60)	CH or CH-MH
88	30	100	99	97	77	42	A–7–5(52)	CH-MH
91	27	100	99	85	61	26	A–7–5(36)	MH
86	31	100	98	86	78	45	A–7–5(45)	CH-MH
89	29	[5]99	96	86	71	36	A–7–5(37)	MH or MH-CH
124	10	100	97	51	17	3	A–4(2)	CL
120	12	100	98	60	21	6	A–4(3)	CL-ML
117	14	100	99	63	24	7	A–4(3)	CL-ML

analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

[3] Based on AASHO Designation M 145–66 *(1)*.

[4] Based on U.S. Department of Defense, MIL–STD–619B (*15*).

[5] 100 percent passed the No. 4 sieve.

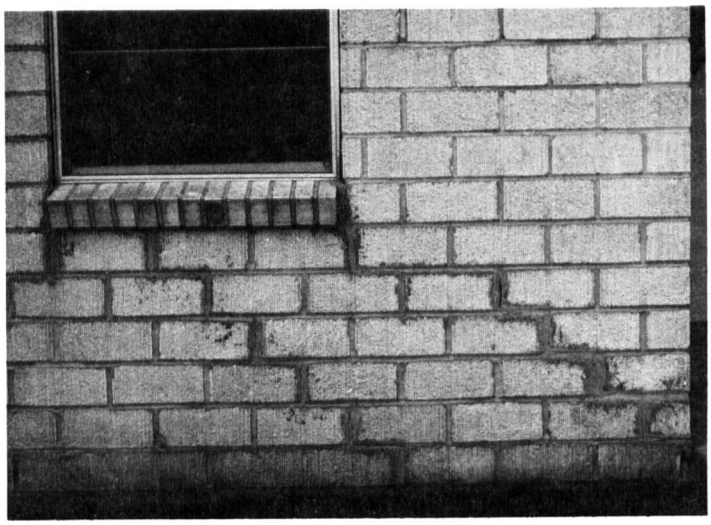

Figure 12.—**The foundation of this house failed and the walls cracked because the soil shrinks when dry and swells when wet. The soil is Oktibbeha clay, 3 to 8 percent slopes, eroded.**

Slope is a soil property that affects difficulty of layout and construction and also the risk of soil erosion, lateral seepage, and downslope flow of effluent. Slopes of 5 to 10 percent are a moderate limitation, and those of more than 10 percent are a severe limitation. Large rocks or boulders increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet long enough for bacteria to decompose the solids. A lagoon has a nearly level floor, and its sides or embankments are compacted soil material. It is assumed that the embankment is compacted to medium density and that the pond is protected from flooding. Properties are considered that affect the pond floor and the embankment. Those that affect the pond floor are permeability, organic-matter content, and slope, and if the floor needs to be leveled, depth to bedrock becomes important. The soil properties that affect the embankment are the engineering properties of the embankment material as interpreted from the Unified Soil Classification and the amount of stones, if any, that influence the ease of excavation and compaction of the embankment material.

Light industry refers to structures that are less than 3 stories high. The properties considered are bearing strength, shrink-swell potential, depth to the water table, flood hazard, natural drainage, and topography.

For recreation facilities, trafficability, productivity, natural drainage, flood hazard, permeability, and topography are important properties. Trafficability is related to surface soil texture and refers to movement of pedestrians, bicycles, and light vehicular traffic. Trafficability is no more than a slight limitation on loamy soils that are not likely to be flooded and that have a water table at a depth of 30 inches or more during the season of heavy use.

Camp sites are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have mild slopes, good drainage, a surface free of rocks and coarse fragments, freedom from flooding during periods of heavy use, and a surface that is firm after rains but not dusty when dry.

Picnic areas are attractive natural or landscaped tracts used mainly for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. The best soils are firm when wet but not dusty when dry; are free of flooding during the season of use; and do not have slopes or stoniness that greatly increases the cost of leveling the sites or of building the access roads.

Play areas are used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrops, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rains but not dusty when dry. If grading and leveling are required, depth to rock is important.

Formation and Classification of the Soils

This section discusses the factors of soil formation, the processes of soil formation, and the classification of the soils in Howard County by higher categories. The classification of soils by higher categories is shown in table 10 on page 66, and laboratory data for some important soil series are given in table 11 on page 68.

Factors of Soil Formation

Soil is formed by the interaction of climate, living organisms, parent material, and relief over a period of time. Each of these factors modifies the effect of the other four. Significant differences in any one of the factors result in differences in soil characteristics.

Climate and living organisms are the active forces in soil formation. Relief, mainly by its influence on runoff and temperature, modifies the effect of climate and living organisms. The parent material also affects the kind of soil that can be formed, and, in extreme cases, determines it almost entirely. Finally, time is needed for the changing of the parent material into soil.

Climate

The climate in Howard County is characterized by long, hot, humid summers; short, mild winters; and abundant rainfall. It probably has not changed much while the soils have been forming. Even though the temperatures may average somewhat lower and the rainfall higher in the Ouachita Mountains in the northern part of the county than in other parts of the county, the climate is relatively uniform throughout the county. Consequently, it does not account for significant differences among the soils.

The warm moist climate promotes rapid chemical reactions and rapid soil formation. Abundant rainfall makes a large amount of water available for the leaching of soluble and colloidal materials *(8)*. Plant remains decompose rapidly, and the organic acids thus produced hasten the development of clay minerals and the removal of carbonates. Because the soil freezes only for short periods of time, soil formation continues almost the year round.

Living organisms

Among the living organisms important in the formation of soils in Howard County are bacteria, fungi, insects, and the more highly developed flora and fauna. These organisms help to increase the content of organic matter, to increase the supply of nitrogen, to decrease or increase the supply of other plant nutrients, and to change the structure and porosity of the soils.

Before settlement of the county, native vegetation had more influence on soil development than did animal activity. The native vegetation of the county was mixed pine and hardwood trees, except in the blackland areas, which were dominantly prairies.

On the poorly drained to well-drained, loamy flood plains and low terraces, the trees were predominantly sweetgum, oaks, ash, baldcypress, sycamore, hackberry, and pecan. In these areas the Marietta and Toine soils and some of the Adaton and Ozan soils formed. In the poorly drained, upland flatwoods, the trees were chiefly oaks, sweetgum, and pines. In these areas some of the Adaton and Ozan soils formed.

On the moderately well drained to somewhat excessively drained, loamy uplands of the Coastal Plain and in the Ouachita Mountains, the trees were chiefly pines, oaks, and hickories. In these areas the Angie, Blevins, Cane, Greenville, Luverne, Millwood, Muskogee, Pickens, Pirum, Ruston, Sacul, Saffell, Savannah, Sherwood, and Tiak soils formed.

On the moderately well drained to well drained Blackland Prairie uplands, the native vegetation was chiefly tall native grasses and some redcedar, elm, and osageorange. In these areas the Demopolis, Oktibbeha, and Sumter soils and some of the Terouge soils formed. Mixed pine and hardwoods grew in many areas of the Oktibbeha soils. On the flood plains in the blackland area, the vegetation was baldcypress and such hardwoods as oaks, sweetgum, hackberry, and ash. In these areas the Kaufman and Leeper soils and some of the Terouge soils formed.

With the development of farming in the county, man has influenced the formation of the soils by clearing the forests and breaking the sod, tilling the soil, introducing new plants, fertilizing, and improving drainage. Only a few results of these activities can be seen now. Among these are changes in the structure and color of the soil, in the content of organic matter and nutrients, and in thickness of the surface layer or plow layer. Many other results may not be evident for several centuries. In many of the areas that have remained in forest, man has influenced the direction of soil formation through such woodland management practices as selective harvesting, improving the timber stand by removing hardwoods, and planting pure stands of preferred species.

Parent material

In the northern part of the county, the parent material of the soils weathered in folded and fractured, acid sandstone, siltstone, and shale, chiefly of Mississippian age. The soils that formed in the residuum weathered from these rocks are the Pirum, Pickens, and Sherwood soils.

In the extreme northeastern part of the county *(2)* is a small area where novaculite crops out. These outcrops, of late Devonian age, are at the highest elevations *(4)*. Such a small amount of novaculite weathers to soil material over such a long period of time that geological erosion removes the soil material almost as soon as it weathers. These areas are mainly Rock land.

In the central part of the county, the soils formed mainly in sediments of Pleistocene and recent age. The sediments of Pleistocene age are terrace deposits of unconsolidated loamy and gravelly material and are on much of the interstream surface. Among the soils that formed in the loamy areas, many of which have interstratified clayey sediment, are Blevins, Ruston, Sacul, and Savannah soils. Saffell soils formed in the gravelly material. Recent alluvial deposits of loamy sediments are on the stream flood plains and low terraces. In these sediments, the Marietta and Toine soils and some of the Adaton and Ozan soils formed.

In the southern part of the county and in a narrow band at about the latitude of the Bethany community, the clayey soil material weathered from chalk and marl of Cretaceous age. On uplands in these areas the Demopolis, Oktibbeha, and Sumter soils and some of the Terouge soils formed. On the flood plains, Kaufman and Leeper soils and some of the Terouge soils formed.

Relief

Relief affects soil formation through its influence on drainage, erosion, plant cover, and soil temperature. In Howard County it ranges from level in some places to nearly vertical (bluffs) in others. The slope is dominantly 1 to 40 percent.

The Ouachita Mountains in the northern part of the county, generally north of the town of Dierks, are characterized by rolling to steep hills that have narrow ridgetops and by narrow stream valleys. Slopes are as much as 50 percent in some places but less than 40 percent in most places. In most of this area runoff is rapid, and geologic erosion has removed so much weathered material that the soils are shallow or only moderately deep.

The Coastal Plain and Blackland Prairie in the central part of the county are characterized by level to rolling topography. Slopes are as much as 20 percent, but most are less than 12 percent.

Scattered throughout the county are level areas where runoff is slow or ponded. In these areas, the soils are gray because of the reduction and transfer of iron.

On flood plains along the streams are long and narrow, mainly level areas where the soils are loamy and clayey. In these areas the slopes are mainly less than

TABLE 9.—*Degree and kind of limitations*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. the instructions for referring to other series

Soil series and map symbols	Dwellings [1]	Septic tank filter fields	Sewage lagoons
Adaton: Ad	Severe: poorly drained; seasonal high water table; some areas subject to flooding; medium bearing strength.	Severe: slow permeability; seasonal high water table; some areas subject to flooding.	Moderate: fair to good material for reservoir sites.
Angie: AnB, AnC	Moderate: moderately well drained; seasonal high water table; medium bearing strength; moderate shrink-swell potential in subsoil; slope.	Severe: slow permeability; seasonal high water table.	Slight where slopes are less than 2 percent. Moderate where slopes are 2 to 7 percent. Severe where slopes are more than 7 percent.
Blevins: BIB, BIC	Moderate: medium bearing strength; slope.	Slight	Moderate: moderate permeability; fair material for reservoir sites. Severe where slopes are more than 7 percent.
Cane: Cac	Moderate: moderately well drained; seasonal high water table; medium bearing strength; slope.	Severe: slow permeability; seasonal high water table.	Moderate: fair to good material for reservoir sites. Severe where slopes are more than 7 percent.
Demopolis: DeD3	Severe: low bearing strength; high shrink-swell potential; shallow to chalk bedrock.	Severe: slow permeability; shallow to chalk bedrock.	Severe: shallow to chalk bedrock; slope.
Greenville: GrC	Moderate: medium bearing strength; slope.	Severe: moderately slow permeability.	Moderate: fair material for reservoir sites. Severe where slopes are more than 7 percent.
Kaufman: Ka	Severe: somewhat poorly drained; seasonal high water table; low bearing strength; high shrink-swell potential; subject to flooding.	Severe: very slow permeability; seasonal high water table; subject to flooding.	Slight
Leeper: Le	Severe: somewhat poorly drained; seasonal high water table; low bearing strength; high shrink-swell potential; subject to flooding.	Severe: very slow permeability; seasonal high water table; subject to flooding.	Slight [2]
Luverne: LuE	Moderate: medium bearing strength; severe where slopes are more than 15 percent.	Severe: moderately slow permeability; slope.	Severe: slope
Marietta: Ma	Severe: moderately well drained; seasonal high water table; medium bearing strength; subject to flooding.	Severe: subject to flooding	Moderate: moderate permeability; fair material for reservoir sites. Severe if subject to flooding.
Millwood: MIC, MID	Severe: medium to low bearing strength; high shrink-swell potential; slope.	Severe: slow permeability	Moderate: fair to good material for reservoir sites; slope. Severe where slopes are more than 7 percent.

of soils for town and country planning

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully that appear in the first column of this table]

Light industry [1]	Recreation		
	Camp sites	Picnic areas	Intensive play areas
Severe: poorly drained; seasonal high water table; some areas subject to flooding; medium bearing strength.	Severe: poorly drained; seasonal high water table; some areas subject to flooding.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table; some areas subject to flooding.
Moderate: moderately well drained; moderate shrink-swell potential; seasonal high water table; medium bearing strength; slope.	Moderate: moderately well drained; slow permeability.	Slight	Moderate: moderately well drained; slow permeability. Severe where slopes are more than 6 percent.
Moderate: medium bearing strength; slope.	Slight	Slight	Slight where slopes are less than 2 percent. Moderate where slopes are 2 to 6 percent. Severe where slopes are more than 6 percent.
Moderate: moderately well drained; seasonal high water table; medium bearing strength; slope.	Moderate: moderately well drained; slow permeability.	Slight	Moderate: moderately well drained; slow permeability. Severe where slopes are more than 6 percent.
Severe: low bearing strength; high shrink-swell potential; shallow to bedrock.	Severe: clayey surface layer; poor trafficability; slow permeability; difficult to maintain vegetative cover; slope.	Severe: clayey surface layer; poor trafficability; slope.	Severe: clayey surface layer; poor trafficability; slow permeability; difficult to maintain vegetative cover; slope.
Moderate: medium bearing strength; slope.	Moderate: moderately slow permeability.	Slight	Moderate: moderately slow permeability. Severe where slopes are more than 6 percent.
Severe: somewhat poorly drained; seasonal high water table; low bearing strength; high shrink-swell potential; subject to flooding.	Severe: clayey surface layer; poor trafficability; seasonal high water table; subject to flooding; very slow permeability.	Severe: clayey surface layer; poor trafficability; seasonal high water table; subject to flooding.	Severe: clayey surface layer; poor trafficability; somewhat poorly drained; seasonal high water table; subject to flooding; very slow permeability.
Severe: somewhat poorly drained; seasonal high water table; low bearing strength; high shrink-swell potential; subject to flooding.	Severe: clayey surface layer; poor trafficability; somewhat poorly drained; seasonal high water table; subject to flooding; very slow permeability.	Severe: clayey surface layer; poor trafficability; seasonal high water table; subject to flooding.	Severe: clayey surface layer; poor trafficability; somewhat poorly drained; seasonal high water table; subject to flooding; very slow permeability.
Severe: slope; medium bearing strength.	Moderate: moderately slow permeability; slope. Severe where slopes are more than 15 percent.	Moderate where slopes are 8 to 15 percent. Severe where slopes are more than 15 percent.	Severe: slope.
Severe: moderately well drained; seasonal high water table; medium bearing strength; subject to flooding.	Moderate to severe: subject to flooding.	Slight to moderate: subject to flooding.	Severe: subject to flooding.
Severe: medium to low bearing strength; moderate to high shrink-swell potential.	Moderate: slow permeability; slope.	Slight: where slopes are less than 8 percent. Moderate where slopes are more than 8 percent.	Moderate: slow permeability; slope. Severe where slopes are more than 6 percent.

TABLE 9.—*Degree and kind of limitations of*

Soil series and map symbols	Dwellings[1]	Septic tank filter fields	Sewage lagoons
Muskogee: MuB	Moderate to severe: moderately well drained; seasonal high water table; medium bearing strength; high shrink-swell potential below a depth of 24 inches.	Severe: slow permeability; seasonal high water table.	Moderate: fair to good material for reservoir sites; slope where more than 2 percent.
Oktibbeha: OkC2, OkD2	Severe: seasonal high water table; low bearing strength; high shrink-swell potential; slope; moderately deep to chalk bedrock.	Severe: very slow permeability; slope; moderately deep to chalk bedrock.	Moderate: moderately deep to chalk bedrock; fair to good material for reservoir sites; slope. Severe where slopes are more than 7 percent.
Ozan: On	Severe: poorly drained; seasonal high water table; medium bearing strength; some areas subject to flooding.	Severe: slow permeability; seasonal high water table; some areas subject to flooding.	Moderate: fair material for reservoir sites.
*Pickens: PcD, PkE For Sherwood part of PkE, see Sherwood series. Limitations of Rock land in PkE are too variable for reliable interpretation.	Severe: shallow to shale bedrock; slope.	Severe: shallow to shale bedrock; slope.	Severe: shallow to shale bedrock; slope.
*Pirum: PmC, PpB, PsB For Pickens part of PpB, see Pickens series; for Sherwood part of PsB, see Sherwood series.	Moderate: moderately deep to sandstone bedrock; medium bearing strength. Severe where slopes are more than 6 percent.	Severe: moderate permeability; moderately deep to sandstone bedrock; slope.	Severe: moderately deep to sandstone bedrock; slope; fair material for reservoir sites.
Rock land. Mapped only in association with Pickens and Sherwood soils. Limitations are too variable for reliable interpretation.			
Ruston: RuB, RuC	Moderate: medium bearing strength; slope.	Slight	Moderate: moderate permeability; fair material for reservoir sites. Severe where slopes are more than 7 percent.
Sacul: SaB, SaC, SaD	Moderate: medium bearing strength; moderate shrink-swell potential in subsoil; slope.	Severe: slow permeability	Moderate: fair material for reservoir sites; slope. Severe where slopes are more than 7 percent.
Saffell: SeB, SeC, SeE	Slight where slopes are less than 6 percent. Moderate where slopes are 6 to 15 percent. Severe where slopes are more than 15 percent.	Slight where slopes are less than 5 percent. Moderate where slopes are 5 to 10 percent. Severe where slopes are more than 10 percent.	Severe: moderately rapid permeability; fair material for reservoir sites; high content of coarse fragments; slope.
Savannah: SfB, SfC	Moderate: moderately well drained; seasonal high water table; medium bearing strength; slope.	Severe: moderately slow permeability; seasonal high water table.	Moderate: fair material for reservoir sites. Severe where slopes are more than 7 percent.

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Light industry [1]	Recreation		
	Camp sites	Picnic areas	Intensive play areas
Moderate: moderately well drained; seasonal high water table; medium bearing strength; high shrink-swell potential below a depth of 24 inches.	Moderate: moderately well drained; slow permeability.	Slight	Moderate: moderately well drained; seasonal high water table; slow permeability; slope.
Severe: low bearing strength; high shrink-swell potential; moderately deep to chalk bedrock; slope.	Severe: clayey surface layer; poor trafficability; very slow permeability.	Severe: clayey surface layer; poor trafficability.	Severe: clayey surface layer; poor trafficability; very slowly permeable; slope.
Severe: poorly drained; seasonal high water table; medium bearing strength; some areas subject to flooding.	Severe: poorly drained; seasonal high water table; some areas subject to flooding.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table; some areas subject to flooding.
Severe: shallow to shale bedrock; slope.	Moderate: difficult to maintain vegetative cover; coarse fragments on surface; slope. Severe where slopes are more than 15 percent.	Moderate: coarse fragments on surface; slope. Severe where slopes are more than 15 percent.	Severe: shallow to bedrock; coarse fragments on surface; slope.
Moderate where slopes are less than 4 percent; moderately deep to sandstone bedrock; medium bearing strength. Severe where slopes are more than 4 percent.	Slight	Slight	Moderate: coarse fragments on surface; slope. Severe where slopes are more than 6 percent.
Moderate: medium bearing strength; slope.	Slight	Slight	Slight where slopes are less than 2 percent. Moderate where slopes are 2 to 6 percent. Severe where slopes are more than 6 percent.
Moderate: medium bearing strength; moderate shrink-swell potential in subsoil; slope. Severe where slopes are more than 8 percent.	Moderate: slow permeability; slope.	Slight: where slopes are less than 8 percent. Moderate where slopes are more than 8 percent.	Moderate: slow permeability; slope. Severe where slopes are more than 6 percent.
Slight where slopes are less than 4 percent. Moderate where slopes are 4 to 8 percent. Severe where slopes are more than 8 percent.	Moderate: fair trafficability; coarse fragments on surface; slope. Severe where slopes are more than 15 percent.	Moderate: fair trafficability; coarse fragments on surface; slope. Severe where slopes are more than 15 percent.	Severe: fair trafficability; coarse fragments on surface; slope.
Moderate: moderately well drained; seasonal high water table; medium bearing strength; slope.	Moderate: moderately well drained; moderately slow permeability.	Slight	Moderate: moderately well drained; moderately slow permeability; slope. Severe where slopes are more than 6 percent.

TABLE 9.—*Degree and kind of limitations of*

Soil series and map symbols	Dwellings[1]	Septic tank filter fields	Sewage lagoons
*Sherwood: ShC, ShD, SkD--- For Pickens part of SkD, see Pickens series.	Moderate: moderately deep to sandstone bedrock; medium bearing strength. Severe where slopes are more than 6 percent.	Severe: moderately deep to sandstone bedrock; moderate permeability; slope.	Severe: moderately deep to sandstone bedrock; slope; fair material for reservoir sites.
*Sumter: SmD2, SoD--------- For Oktibbeha part of SoD, see Oktibbeha series.	Severe: low bearing strength; high shrink-swell potential; moderately deep to chalk bedrock; slope.	Severe: slow permeability; slope; moderately deep to chalk bedrock.	Severe: moderately deep to chalk bedrock; fair to good material for reservoir sites; slope.
Terouge: TeA, TeB----------	Severe: somewhat poorly drained; seasonal high water table; low bearing strength; high shrink-swell potential; TeA subject to flooding.	Severe: seasonal high water table; very slow permeability; TeA subject to flooding.	Slight to moderate: good to fair material for reservoir sites; some slopes are more than 2 percent. Severe in TeA: subject to deep flooding.
Tiak: TkE----------	Severe: seasonal high water table; medium to low bearing strength; moderate to high shrink-swell potential; slope.	Severe: seasonal high water table; slow permeability.	Severe: slope; fair to good material for reservoir sites.
Toine: To----------	Severe: medium bearing strength; seasonal high water table; subject to flooding.	Severe: moderate permeability; seasonal high water table; subject to flooding.	Moderate: moderate permeability; fair material for reservoir sites. Severe where subject to deep flooding.

[1] Engineers and others should not apply specific values to the estimates given for bearing strength of soils.
[2] Severe where subject to flooding.

soils for town and country planning—Continued

Light industry [1]	Recreation		
	Camp sites	Picnic areas	Intensive play areas
Moderate where slopes are less than 4 percent: medium bearing strength; moderately deep to sandstone bedrock. Severe where slopes are more than 4 percent.	Slight where slopes are less than 8 percent. Moderate where 20 percent or more coarse fragments on surface or where slopes are 8 to 15 percent. Severe where slopes are more than 15 percent.	Slight where slopes are less than 8 percent. Moderate where 20 percent or more coarse fragments are on surface or where slopes are 8 to 15 percent. Severe where slopes are more than 15 percent.	Moderate where slopes are less than 6 percent: moderately deep over sandstone bedrock. Severe where 20 percent or more coarse fragments are on surface or where slopes are more than 6 percent.
Severe: low bearing strength; high shrink-swell potential; moderately deep to chalk bedrock; slope.	Severe: clayey surface layer; poor trafficability.	Severe: clayey surface layer; poor trafficability.	Severe: clayey surface layer; poor trafficability; slope.
Severe: somewhat poorly drained; seasonal high water table; low bearing strength; high shrink-swell potential; TeA subject to flooding.	Severe: clayey surface layer; poor trafficability; somewhat poorly drained; seasonal high water table; very slow permeability; TeA subject to flooding.	Severe: clayey surface layer; poor trafficability; seasonal high water table; TeA subject to flooding.	Severe: clayey surface layer; poor trafficability; somewhat poorly drained; seasonal high water table; very slow permeability; TeA subject to flooding.
Severe: slope; seasonal high water table; medium to low bearing strength; moderate to high shrink-swell potential.	Moderate where slopes are less than 15 percent: slow permeability. Severe where slopes are more than 15 percent.	Moderate where slopes are less than 15 percent. Severe where slopes are more than 15 percent.	Severe: slope; slow permeability.
Severe: medium bearing strength; seasonal high water table; subject to flooding.	Moderate to severe: subject to flooding.	Slight to moderate: subject to flooding.	Moderate to severe: subject to flooding.

TABLE 10.—*Soil series classified by higher categories*

Series	Family	Subgroup	Order
Adaton [1]	Fine-silty, mixed, thermic	Typic Ochraqualfs	Alfisols.
Angie	Clayey, mixed, thermic	Aquic Paleudults	Ultisols.
Blevins	Fine-silty, siliceous, thermic	Typic Paleudults	Ultisols.
Cane	Fine-loamy, siliceous, thermic	Typic Fragiudults	Ultisols.
Demopolis	Loamy-skeletal, carbonatic, thermic, shallow	Typic Udorthents	Entisols.
Greenville [1]	Clayey, kaolinitic, thermic	Rhodic Paleudults	Ultisols.
Kaufman [1]	Fine, montmorillonitic, noncalcareous, thermic	Vertic Haplaquolls	Mollisols.
Leeper	Fine, montmorillonitic, nonacid, thermic	Chromudertic Haplaquepts	Inceptisols.
Luverne [1]	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Marietta, silty subsoil variant.	Fine-silty, mixed, thermic	Fluvaquentic Eutrochrepts	Inceptisols.
Millwood	Very fine, montmorillonitic, thermic	Vertic Paleudalfs	Alfisols.
Muskogee	Fine-silty, mixed, thermic	Aquic Paleudalfs	Alfisols.
Oktibbeha	Very fine, montmorillonitic, thermic	Vertic Hapludalfs	Alfisols.
Ozan	Coarse-loamy, siliceous, thermic	Typic Glossaqualfs	Alfisols.
Pickens	Loamy-skeletal, mixed, thermic	Lithic Dystrochrepts	Inceptisols.
Pirum	Fine-loamy, siliceous, thermic	Typic Hapludults	Ultisols.
Ruston	Fine-loamy, siliceous, thermic	Typic Paleudults	Ultisols.
Sacul	Clayey, mixed, thermic	Aquic Hapludults	Ultisols.
Saffell	Loamy-skeletal, siliceous, thermic	Typic Hapludults	Ultisols.
Savannah	Fine-loamy, siliceous, thermic	Typic Fragiudults	Ultisols.
Sherwood	Fine-loamy, mixed, thermic	Typic Hapludults	Ultisols.
Sumter	Fine-silty, carbonatic, thermic	Rendollic Eutrochrepts	Inceptisols.
Terouge	Very fine, montmorillonitic (calcareous), thermic	Vertic Haplaquolls	Mollisols.
Tiak	Clayey, mixed, thermic	Aquic Paleudults	Ultisols.
Toine	Fine-loamy, mixed, thermic	Ultic Haplaudalfs	Alfisols.

[1] The soils in this county that are taxadjuncts to the series for which they are named and the reasons that they differ from the defined range for the series follow:

Adaton soils have a solum that is 20 to 30 percent sand, but less than 15 percent is defined for the series.

Greenville soils are finer textured, have about 74 percent clay in the upper 20 inches of the B horizon, and are mottled within 40 inches of the surface.

Kaufman soils have a moist chroma of 2 in the upper 22 inches of the profile but chromas of less than 2 are defined for the series.

Luverne soils have a solum that lacks mica flakes.

These differences do not alter the usefulness or behavior of the soils.

1 percent and rarely more than 2 percent. Most of these areas are subject to occasional or more frequent floods that deposit more sediment.

Time

The length of time required for formation of soil depends largely upon the other factors of soil formation. Less time generally is required if the climate is warm and humid, the vegetation is luxuriant, and the parent material is loamy. Generally, older soils show a greater degree of differentiation between horizons.

The soils of the uplands generally have the most strongly developed argillic horizons and are the most mature soils in Howard County. On uplands some soils, such as Pickens soils, contain so little clay and are so shallow to bedrock that they are not likely to develop mature profiles in the near geologic future. Soils of the flood plains are of younger material and are much less mature than most soils of the uplands. Among these are Marietta and Toine soils.

Processes of Soil Formation

Most soil profiles contain three major horizons—A, B, and C. Some have an R horizon of bedrock. The A horizon is the surface layer. It can be the A1 horizon, which is the horizon of maximum accumulation of organic matter, or the A2 horizon, which is the horizon of maximum leaching of dissolved or suspended materials.

The B horizon is immediately beneath the A horizon. It contains the maximum accumulation of dissolved or suspended materials, such as iron or clay. The B horizon generally is firmer than horizons immediately above and below it and commonly has blocky structure.

The C horizon is beneath the B horizon. It generally has been little affected by soil-forming processes, but it can consist of material that has been modified by weathering. In some young soils, there is no B horizon, and the C horizon is immediately below the A horizon. In these soils the C horizon has been slightly modified by living organisms as well as by weathering.

The soils of Howard County have horizons that formed through one or more of the following processes: (1) the accumulation of organic matter, (2) the leaching of bases, (3) the reduction and transfer of iron, and (4) the translocation of silicate clay minerals. In most of the soils, more than one of these processes was involved.

Accumulation of organic matter in the uppermost part of the profile has been an important process in horizon development. The A1 horizon is darker colored than the A2 horizon because it contains more organic matter. In the A2 horizon, organic matter as well as clay minerals and iron oxide have been removed. The content of organic matter ranges from very low to moderate in most of the soils of Howard County.

Most of the soils of the county have been leached of carbonates. Generally, the leaching of bases precedes the translocation of silicate clay minerals.

Reduction and transfer of iron are evident in all of the somewhat poorly drained and poorly drained soils. This process is called gleying. Gray colors in the layers below the surface are evidence of the reduction and loss of iron. Mottles of red, brown, and yellow in some horizons and iron concretions in others indicate the segregation of iron. The iron concretions are made up of segregated iron compounds in complex with organic matter and oxides of manganese or other metals. Gleying has been important in the formation of Adaton and Ozan soils.

Translocation, or downward movement, of clay minerals has contributed to horizon development in most of the soils. The eluviated A2 horizon contains less clay and generally is lighter colored than the B horizon. Clay has accumulated in the B horizons in the form of clay films in pores and on surface peds. In most soils the C horizon contains less clay than the B horizon.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in such large areas as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current system should refer to the latest literature available *(7, 12)*.

The current system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system, the criteria used as a basis for classification are properties that are observable or measurable. The properties are chosen, however, so that soils of similar genesis, or mode or origin, are grouped. Placement of some series in the current system of classification, particularly in families, may change as more precise information becomes available. In table 10, the soil series of Howard County are placed in three categories of the current system. Classes of the current system are briefly described in the following paragraphs.

ORDER. Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this, the Entisols and Histosols, occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* (Ent-i-sol).

As shown in table 10, five soil orders are represented in Howard County—Entisols, Inceptisols, Mollisols,

TABLE 11.—*Physical and chemical*

[Analyses made by the University of Arkansas, Fayetteville. Dashes indicate that

Soil and sample number	Depth from surface	Particle-size distribution						
		Horizon	Very coarse sand through medium sand (2.0 to 0.25 mm)	Fine sand (0.25 to 0.10 mm)	Very fine sand (0.10 to 0.05 mm)	Total sand (2.0 to 0.05 mm)	Silt (0.05 to 0.002 mm)	Clay (smaller than 0.002 mm)
	In		*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*
Angie silt loam: S68–Ark–31–31.	0–7	A1	8	9	14	31	48	21
	7–16	B1	5	9	11	25	41	34
	16–24	B21t	5	7	11	23	41	36
	24–42	B22tg	4	8	9	21	38	41
	42–56	B23tg	3	5	9	17	37	46
	56–72	B24tg	3	7	8	18	31	51
Blevins loam: S68–Ark–31–23.	0–7	A1	2	9	38	49	48	3
	7–16	A2	----------	7	30	37	60	3
	16–22	B21t	----------	7	30	37	48	15
	22–32	B22t	----------	5	23	28	54	18
	32–45	B23t	----------	5	27	32	44	24
	45–54	B24t	----------	5	23	28	57	15
	54–72	B25t	1	7	33	41	42	17
Cane fine sandy loam: S68–Ark–31–16.	0–4	Ap	11	39	16	66	28	6
	4–8	A12	6	28	9	43	49	8
	8–14	B1	8	25	10	43	40	17
	14–24	B2t	6	23	8	37	37	26
	24–39	Bx1	6	20	12	38	33	29
	39–50	Bx1	4	21	16	41	28	31
	50–58	Bx2	4	22	7	33	42	25
	58–72	Bx3	8	19	10	37	29	34
Millwood fine sandy loam: S68–Ark–31–32.	0–7	A1	3	14	33	50	37	13
	7–17	B31t	2	4	11	17	20	63
	17–30	B22t	3	3	7	13	24	63
	30–41	B23t	2	4	8	14	29	57
	41–52	B24tg	4	4	7	15	29	56
	52–72	B25t	2	4	8	14	30	56
Muskogee silt loam: S68–Ark–31–38.	0–6	Ap	2	4	25	31	56	13
	6–12	B1	1	1	19	21	55	24
	12–24	B21t	----------	1	13	14	47	39
	24–32	B22tg	1	1	14	16	45	39
	32–43	B23tg	----------	1	12	13	51	36
	43–61	B24tg	----------	1	13	14	41	45
	61–72	Cg	----------	1	11	12	43	45
Oktibbeha clay: S68–Ark–31–6.	0–5	Ap	18	2	1	21	35	44
	5–12	B21t	----------	1	9	10	29	61
	12–19	B22t	----------	2	10	12	24	64
	19–29	B23t	1	1	12	14	28	58
	29–33	B24t	----------	1	16	17	29	54
	33–42	B3	----------	3	12	15	31	54
	42–51	IICg	1	12	15	28	32	40
Ozan fine sandy loam: S68–Ark–31–29.	0–6	A1	9	17	15	41	51	8
	6–15	A2g	7	17	17	41	51	8
	15–29	B21tg	7	17	16	40	48	12
	29–38	B22tg	7	15	14	36	49	15
	38–56	B23tg	6	14	16	36	48	16
	56–72	B3g	8	18	14	40	44	16
Pirum fine sandy loam: S68–Ark–31–3.	0–6	A1	13	38	7	58	31	11
	6–11	A2	25	20	8	53	34	13
	11–16	B21t	9	30	10	49	27	24
	16–30	B22t	10	26	9	45	22	33
	30–36	B23t	9	32	7	48	27	25

analyses of selected soils

no analysis was made or that data resulting from the analysis were insignificant]

Extractable bases				Extractable acidity	Base saturation	Reaction (soil-water ratio of 1:1)	Organic-matter content	Available phosphorus
Calcium	Magnesium	Sodium	Potassium					
Meq per 100 gm of soil	*Meq per 100 gm of soil*	*Meq per 100 gm of soil*	*Meq per 100 gm of soil*	*Meq per 100 gm of soil*	*Pct*	*pH*	*Pct*	*Parts per million*
6.9	1.3	0.2	0.2	8.3	51	5.8	2.2	5
3.8	1.1	.2	.2	12.9	29	4.9	.7	5
2.4	.9	.2	.2	16.2	19	4.8	.4	3
2.6	.9	.3	.2	16.3	20	5.0	.3	4
3.4	.9	.5	.2	19.6	20	5.0	.3	3
7.4	1.5	.9	.3	20.5	33	5.1	.3	3
1.1	1.0	.1	.1	3.0	43	5.3	1.2	7
.5	.2	.1	.1	2.6	26	5.0	.4	7
3.1	1.1	.1	.3	2.7	63	5.4	.2	8
3.9	1.3	.1	.4	2.7	68	5.5	.2	5
4.0	1.5	.1	.5	4.3	59	5.6	.2	2
.9	.7	.1	.2	7.3	21	5.0	.1	2
.5	.5	.2	.2	11.7	11	4.9	.1	2
1.4	.2	.1	.1	2.0	47	5.7	.2	8
2.0	.3	.1	.1	2.4	51	5.9	.2	7
1.1	.6	.1	.1	4.2	31	4.9	.1	5
.5	1.2	.2	.2	8.0	21	4.8	.1	5
.3	.6	.3	.2	9.0	13	5.0	.1	3
.2	.5	.1	.2	9.7	9	5.0	.1	3
.2	.6	.1	.2	10.2	10	4.8	.1	3
.2	.6	.1	.2	10.8	9	4.7	.1	3
2.2	.6	.1	.1	7.1	30	5.0	1.5	10
17.3	2.9	.3	.3	15.9	57	5.2	.8	7
9.4	1.6	.4	.3	23.5	33	4.9	.5	4
7.5	1.1	.4	.2	23.2	28	5.0	.3	3
12.4	1.5	.7	.3	20.8	42	5.0	.3	3
15.1	1.9	.9	.3	17.4	51	4.8	.2	3
3.6	.5	.2	.1	5.0	47	5.8	1.9	8
3.9	.7	.2	.1	8.1	38	5.0	.3	4
4.4	1.0	.3	.2	15.1	28	4.8	.4	5
3.2	.8	.4	.2	17.0	21	4.8	.3	4
4.4	.8	.4	.2	19.2	23	4.8	.2	4
7.9	1.1	.6	.3	19.8	33	4.8	.1	3
14.0	1.7	.9	.3	15.1	53	4.6	.1	2
27.5	1.6	.2	.4	2.3	93	7.6	3.1	9
25.3	1.7	.2	.4	6.5	81	5.5	1.2	5
20.3	1.5	.2	.4	9.4	70	5.1	.7	4
20.3	1.5	.2	.5	7.9	74	5.1	.5	3
30.9	1.5	.3	.4	4.6	88	5.4	.4	9
36.3	1.6	.4	.3	2.8	93	7.2	.4	16
----------	.9	.3	.3	.2	----------	8.1	.3	2
1.1	.4	.1	.1	4.7	27	4.4	1.4	8
2.1	.4	.1	.1	2.2	55	5.3	.4	4
3.1	.4	.1	.1	2.1	64	5.4	.3	5
4.8	.6	.2	.1	2.8	67	5.5	.3	3
5.5	.7	.1	.1	1.9	77	5.8	.3	3
6.0	.7	.1	.1	.7	91	6.1	.2	3
.6	.4	.2	.1	2.8	32	5.4	1.7	5
.6	.5	.2	.2	1.7	47	5.4	.7	5
.9	.8	.2	.3	3.1	42	5.3	.4	3
.5	.8	.2	.3	4.1	31	5.3	.3	3
.3	.6	.1	.2	3.1	28	5.3	----------	2

TABLE 11.—*Physical and chemical*

Soil and sample number	Depth from surface	Particle-size distribution						
		Horizon	Very coarse sand through medium sand (2.0 to 0.25 mm)	Fine sand (0.25 to 0.10 mm)	Very fine sand (0.10 to 0.05 mm)	Total sand (2.0 to 0.05 mm)	Silt (0.05 to 0.002 mm)	Clay (smaller than 0.002 mm)
	In		*Pct*	*Pct*	*Pct*	*Pct*	*Pct*	*Pct*
Ruston fine sandy loam: S68–Ark–31–19.	0–6	Ap	10	36	10	56	42	2
	6–21	B21t	8	21	10	39	34	27
	21–31	B22t	8	24	7	39	37	24
	31–40	B22t	10	27	14	51	33	16
	40–52	B23t	9	33	9	51	32	17
	52–64	B24t	19	34	15	68	12	20
	64–72	B3	23	38	6	67	17	16
Sherwood fine sandy loam: S68–Ark–31–24.	0–4	A11	11	42	18	71	26	3
	4–9	A12	10	43	16	69	28	3
	9–22	B21t	13	31	12	56	22	22
	22–37	B22t	8	32	13	53	20	27
Terouge clay: S68–Ark–31–8.	0–6	Ap	3	1	1	5	27	68
	6–16	A11	1	1	1	3	22	75
	16–31	A11	1	1	1	3	22	75
	31–44	A12	1	1	1	3	22	75
	44–58	A12	1	1	1	3	35	62
	58–72	AC	1	1	1	3	21	76
Toine loam: S68–Ark–31–17.	0–7	Ap	3	6	19	28	65	7
	7–13	A12	2	29	22	53	37	10
	13–31	B21t	2	23	12	37	43	20
	31–44	B22t	2	11	13	26	55	19
	44–55	B23t	1	10	18	29	53	18
	55–72	B3	4	37	20	61	26	13

analyses of selected soils—Continued

Extractable bases				Extractable acidity	Base saturation	Reaction (soil-water ratio of 1:1)	Organic-matter content	Available phosphorus
Calcium	Magnesium	Sodium	Potassium					
Meq per 100 gm of soil	*Meq per 100 gm of soil*	*Meq per 100 gm of soil*	*Meq per 100 gm of soil*	*Meq per 100 gm of soil*	*Pct*	*pH*	*Pct*	*Parts per milion*
1.7	0.3	----------	0.1	2.5	46	5.5	0.5	28
2.8	1.1	----------	.1	5.6	42	5.2	.3	15
1.2	.7	.1	.1	7.6	22	4.9	.2	8
.6	.5	.1	.1	5.9	18	4.7	.1	4
.5	.3	.1	.1	5.7	15	4.7	.1	4
.3	.2	.1	.1	6.1	10	5.1	----------	4
.5	.3	.1	.1	5.3	16	5.0	----------	----------
.9	.3	.1	.1	6.1	19	4.9	2.3	3
.3	.2	.1	.1	3.1	18	4.9	1.1	7
.2	.7	.2	.2	10.4	11	4.8	.5	4
.1	.6	.2	.2	11.1	9	4.8	.3	2
44.4	2.4	.5	.9	1.9	96	6.6	3.3	4
48.1	2.1	.9	.7	2.0	96	5.9	2.5	4
55.0	2.4	1.5	.8	3.4	95	7.6	2.2	5
51.6	2.5	1.3	.8	3.0	95	7.4	1.7	3
51.6	2.5	1.3	.7	4.6	92	6.2	1.4	3
48.7	3.0	1.8	.7	1.2	99	6.3	1.3	3
3.8	.4	----------	.2	2.0	69	6.3	.7	5
2.4	.7	.1	.1	3.3	50	6.0	.4	5
3.8	2.5	.1	.3	7.1	49	5.1	.3	7
3.1	2.5	.1	.4	11.1	35	4.6	.2	6
2.5	1.8	.2	.3	8.6	36	4.9	.2	7
2.2	1.6	.2	.3	7.5	36	4.9	.1	7

Alfisols, and Ultisols. Entisols are young mineral soils that do not have genetic horizons or have only the beginning of such horizons.

Inceptisols are mineral soils that generally occur on young, but not recent, land surfaces. Horizons have definitely started to form in these soils.

Mollisols are friable soils that have a mollic epipedon, a diagnostic horizon that is a thick, dark-colored layer at the surface. This horizon is much like a surface layer that has formed under grass. It has moderate to strong structure, and it has base saturation of 50 percent or more. These soils are dominantly saturated with bivalent cations and have argillic or cambic horizons. Argillic or cambic horizons are diagnostic horizons that form below the soil surface. An argillic horizon is one in which illuvial silicate clay has accumulated. This horizon is called a natric horizon if it contains an appreciable amount of exchangeable sodium and has prismatic or columnar structure. A cambic horizon is a layer in which changes have been sufficient to give rise to soil structure, liberate iron, form silicate clay minerals, obliterate most evidence of the original rock structure, or some combination of these changes.

Alfisols are soils that have argillic or natric horizons with accumulated iron and aluminum. Alfisols have a base saturation of more than 35 percent.

Ultisols are highly weathered and strongly developed, and they have a base saturation of less than 35 percent.

SUBORDER.—Each order is divided into suborders that are based primarily on those soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is *Aquent (Aqu,* meaning water or wet, and *ent,* from Entisol).

GREAT GROUP.—Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is *Haplaquents (Hapl,* meaning simple horizons, *aqu* for wetness or water, and *ent,* from Entisols).

SUBGROUP.—Great groups are divided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is *Typic Haplaquents* (a typical Haplaquent).

FAMILY.—Soil families are separated within a subgroup primarily on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and other features that are used to differentiate families. An example is the coarse-loamy, siliceous, acid, thermic family of Typic Haplaquents.

Physical and Chemical Analyses

Physical and chemical data resulting from laboratory analyses can be useful to the soil scientist in classifying soils. These data are helpful in estimating available water capacity, acidity, base-exchange capacity, mineralogical composition, organic-matter content, and other soil characteristics that affect management needs. The data are also helpful in developing concepts of soil formation. More recently, laboratory data have proved helpful in rating soils for nonfarm uses, that is, for residential, industrial, recreational, or transportational use.

Several factors are involved in selecting soils for laboratory analyses. Soils that are extensive and most important in the survey area are considered first. A review of available laboratory data is made to determine the need for additional information on these particular soils. Generally, priority is given to soils for which little or no laboratory data are available.

In Howard County, soils representing 12 soil series were selected for laboratory analyses. Profiles of these soils are described in the section "Descriptions of the Soils." The analyses were made by the University of Arkansas in Fayetteville. Table 11 shows the results.

Particle-size distribution was determined by the hydrometer method *(5)*.

Organic carbon was determined by the Walkley-Black method of digestion with potassium dichromate-sulfuric acid *(6)*. The percentage of organic matter was then calculated by multiplying the percentage of organic carbon by 1.72.

Soil pH was determined using a Beckman pH meter on mixtures of soil and water at a 1:1 ratio. Available phosphorus was extracted by the Bray No. 1 solution (0.03 normal NHF in 0.025 normal HCl) and determined colorimetrically.

The bases were extracted with 1 normal ammonium acetate that has a pH of 7. Magnesium was determined colorimetrically *(6)*. The other bases were determined by flame-photometry. The extractable acidity was determined by the barium chloride-triethanolamine method *(3)*.

The total of extractable calcium, potassium, magnesium, sodium, and extractable acidity is an approxi-

mation of the cation-exchange capacity of the soil. Base saturation percent was determined by dividing this total into the sum of calcium, potassium, magnesium, and sodium and multiplying by 100.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or Cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the diffierence between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Drainage that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A horizon and upper part of the B horizon and have mottling in the lower part of the B horizon and in the C horizon.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods; they are light gray and generally mottled from the surface downward, but some have few or no mottles.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Eluviation. The movement of material from one place to another within the soil, in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants when other growth factors, such as light, moisture, temperature, and the physical condition of the soil, are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic-matter content and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is

hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (or subsoil) of many soils has moved into the B horizon from the A horizon above, the B horizon is called an illuvial horizon.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow*, *slow*, *moderately slow*, *moderate*, *moderately rapid*, *rapid*, and *very rapid*.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Only the upper part of this, modified by organisms and other soil-building forces, is regarded by soil scientists as soil. Most American engineers speak of the whole regolith, even to great depths, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. As a soil separate, individual rock or mineral fragments that range from 0.05 to 2.0 millimeters in diameter. Most sand grains consist of quartz, but the sand may be of any mineral composition. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays where there is marked change in moisture content.

Slope classes. The slope classes used in this survey are as follows:

	Percent of slope		*Percent of slope*
Level	0 to 1	Moderately steep	12 to 20
Nearly level	1 to 3	Undulating	1 to 8
Gently sloping	3 to 8	Rolling	8 to 20
Moderately sloping	8 to 12	Hilly	20 to 50

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); and IV (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

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GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. Other information is given in the tables as follows:

Acreage and extent, table 2, page 8.
Predicted yields, table 3, page 34.
Woodland, table 4, page 36.
Wildlife, table 5, page 42.
Engineering uses of the soils, tables 6, 7, and 8, pages 46 through 57.
Town and country planning, table 9, page 60.

Map symbol	Mapping unit	Described on page	Capability unit	Woodland group
			Symbol	Symbol
Ad	Adaton silt loam	8	IIIw-1	2w9a
AnB	Angie silt loam, 1 to 3 percent slopes	9	IIIe-1	2o7a
AnC	Angie silt loam, 3 to 8 percent slopes	9	IVe-1	2o7a
BlB	Blevins loam, 1 to 3 percent slopes	10	IIe-1	3o1
BlC	Blevins loam, 3 to 8 percent slopes	10	IIIe-2	3o1
CaC	Cane fine sandy loam, 3 to 8 percent slopes	11	IIIe-2	3o7a
DeD3	Demopolis silty clay, 3 to 12 percent slopes, severely eroded	11	VIe-1	4d3c
GrC	Greenville loam, 3 to 8 percent slopes	12	IIIe-2	3o1
Ka	Kaufman clay	13	------	1w6
	Occasionally flooded	--	IIw-1	----
	Frequently flooded	--	IVw-1	----
Le	Leeper silty clay	14	------	1w6
	Occasionally flooded	--	IIw-1	----
	Frequently flooded	--	IVw-1	----
LuE	Luverne fine sandy loam, 8 to 20 percent slopes	15	VIe-2	3c2
Ma	Marietta silt loam, silty subsoil variant	16	------	1w8
	Occasionally flooded	--	IIw-2	----
	Frequently flooded	--	IVw-2	----
MlC	Millwood fine sandy loam, 3 to 8 percent slopes	16	IVe-1	3c2
MlD	Millwood fine sandy loam, 8 to 12 percent slopes	17	VIe-2	3c2
MuB	Muskogee silt loam, 1 to 3 percent slopes	17	IIe-3	207a
OkC2	Oktibbeha clay, 3 to 8 percent slopes, eroded	18	IVe-3	3c8
OkD2	Oktibbeha clay, 8 to 12 percent slopes, eroded	18	VIe-3	3c8
On	Ozan fine sandy loam	19	IIIw-1	2w9a
PcD	Pickens soils, 3 to 12 percent slopes	19	VIs-1	4d3
PkE	Pickens-Sherwood-Rock land association, hilly 1/	20	------	----
	Pickens soil	--	VIIs-1	4d3
	Sherwood soil	--	VIIe-2	3o7
	Rock land	--	VIIs-1	5d3
PmC	Pirum fine sandy loam, 3 to 8 percent slopes	21	IIIe-2	3o7
PpB	Pirum-Pickens association, undulating 1/	21	------	----
	Pirum soil	--	IIIe-2	3o7
	Pickens soil	--	VIs-1	4d3
PsB	Pirum-Sherwood association, undulating 1/	22	IIIe-2	3o7
RuB	Ruston fine sandy loam, 1 to 3 percent slopes	23	IIe-1	3o1
RuC	Ruston fine sandy loam, 3 to 8 percent slopes	23	IIIe-2	3o1
SaB	Sacul fine sandy loam, 1 to 3 percent slopes	24	IIIe-1	3c2
SaC	Sacul fine sandy loam, 3 to 8 percent slopes	24	IVe-1	3c2
SaD	Sacul fine sandy loam, 8 to 12 percent slopes	25	VIe-2	3c2
SeB	Saffell gravelly sandy loam, 1 to 3 percent slopes	25	IIe-2	4f2
SeC	Saffell gravelly sandy loam, 3 to 8 percent slopes	25	IIIe-3	4f2
SeE	Saffell gravelly sandy loam, 8 to 20 percent slopes	25	VIe-4	4f2
SfB	Savannah fine sandy loam, 1 to 3 percent slopes	27	IIe-1	3o7a
SfC	Savannah fine sandy loam, 3 to 8 percent slopes	27	IIIe-2	3o7a
ShC	Sherwood fine sandy loam, 3 to 8 percent slopes	28	IIIe-2	3o7
ShD	Sherwood fine sandy loam, 8 to 12 percent slopes	28	IVe-2	3o7
SkD	Sherwood-Pickens association, rolling 1/	28	------	----
	Sherwood soil	--	VIe-5	3o7
	Pickens soil	--	VIIs-1	4d3
SmD2	Sumter clay, 3 to 12 percent slopes, eroded	29	VIe-3	4c2c

Map symbol	Mapping unit	Described on page	Capability unit	Woodland group
SoD	Sumter-Oktibbeha association, rolling 1/	29	VIe-3	----
	Sumter soil	--	------	4c2c
	Oktibbeha soil	--	------	3c8
TeA	Terouge clay, 0 to 1 percent slopes	30	------	1w6
	Occasionally flooded	--	IIw-1	-----
	Frequently flooded	--	IVw-1	----
TeB	Terouge clay, 1 to 3 percent slopes	30	IIe-4	4c2c
TkE	Tiak soils, 8 to 20 percent slopes	31	VIIe-1	3c2
To	Toine loam	32	------	2o7
	Occasionally flooded	--	IIw-2	----
	Frequently flooded	--	IVw-2	----

1/ The delineations are much larger and the composition of these units is more variable than other mapping units in the county. Mapping has been controlled well enough for the anticipated use of the soils.

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SOIL ASSOCIATIONS *

1 — Sherwood-Pickens association: Moderately deep and shallow, well drained and somewhat excessively drained, loamy, acid soils on low mountains

2 — Saffell-Sacul association: Deep, well drained and moderately well drained, nearly level to moderately steep, loamy, acid soils on rolling Coastal Plain uplands

3 — Blevins-Sacul-Ruston association: Deep, well drained and moderately well drained, nearly level to moderately sloping, loamy, acid soils on rolling Coastal Plain uplands

4 — Ozan-Adaton-Toine association: Deep, poorly drained and well drained, level, loamy, acid soils on bottom lands and low stream terraces in the Coastal Plain

5 — Oktibbeha-Sumter-Leeper association: Deep and moderately deep, well drained to somewhat poorly drained, nearly level to moderately steep, clayey, acid and alkaline soils on uplands and flood plains in the blacklands

*The terms for texture used in the descriptive heading for the associations apply to the surface layer of the major soils.

Compiled 1972

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE

ARKANSAS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

HOWARD COUNTY, ARKANSAS

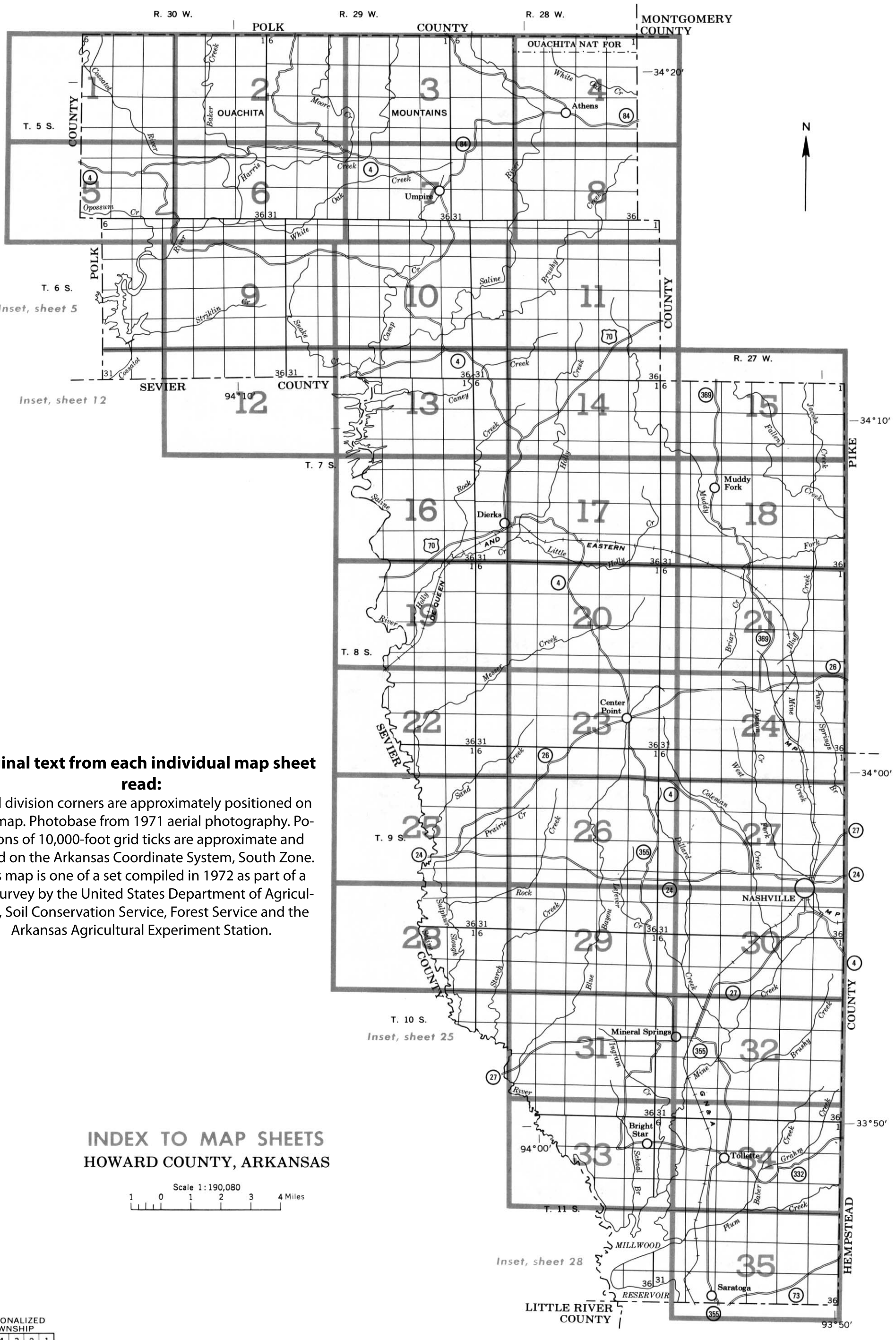
Scale 1:190,080

1 0 1 2 3 4 Miles

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



Original text from each individual map sheet read:

Land division corners are approximately positioned on this map. Photobase from 1971 aerial photography. Positions of 10,000-foot grid ticks are approximate and based on the Arkansas Coordinate System, South Zone. This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, Forest Service and the Arkansas Agricultural Experiment Station.

INDEX TO MAP SHEETS

HOWARD COUNTY, ARKANSAS

Scale 1:190,080

1 0 1 2 3 4 Miles

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, or E, shows the slope. Symbols without a slope letter are those of nearly level soils. A final number, 2 or 3, in the symbol shows that the soil is eroded or severely eroded.

SYMBOL	NAME
Ad	Adaton silt loam
AnB	Angie silt loam, 1 to 3 percent slopes
AnC	Angie silt loam, 3 to 8 percent slopes
BlB	Blevins loam, 1 to 3 percent slopes
BlC	Blevins loam, 3 to 8 percent slopes
CaC	Cane fine sandy loam, 3 to 8 percent slopes
DeD3	Demopolis silty clay, 3 to 12 percent slopes, severely eroded
GrC	Greenville loam, 3 to 8 percent slopes
Ka	Kaufman clay
Le	Leeper silty clay
LuE	Luverne fine sandy loam, 8 to 20 percent slopes
Ma	Marietta silt loam, silty subsoil variant
MlC	Millwood fine sandy loam, 3 to 8 percent slopes
MlD	Millwood fine sandy loam, 8 to 12 percent slopes
MuB	Muskogee silt loam, 1 to 3 percent slopes
OkC2	Oktibbeha clay, 3 to 8 percent slopes, eroded
OkD2	Oktibbeha clay, 8 to 12 percent slopes, eroded
On	Ozan fine sandy loam
PcD	Pickens soils, 3 to 12 percent slopes
PkE	Pickens-Sherwood-Rock land association, hilly *
PmC	Pirum fine sandy loam, 3 to 8 percent slopes
PpB	Pirum-Pickens association, undulating *
PsB	Pirum-Sherwood association, undulating *
RuB	Ruston fine sandy loam, 1 to 3 percent slopes
RuC	Ruston fine sandy loam, 3 to 8 percent slopes
SaB	Sacul fine sandy loam, 1 to 3 percent slopes
SaC	Sacul fine sandy loam, 3 to 8 percent slopes
SaD	Sacul fine sandy loam, 8 to 12 percent slopes
SeB	Saffell gravelly sandy loam, 1 to 3 percent slopes
SeC	Saffell gravelly sandy loam, 3 to 8 percent slopes
SeE	Saffell sandy loam, 8 to 20 percent slopes
SfB	Savannah fine sandy loam, 1 to 3 percent slopes
SfC	Savannah fine sandy loam, 3 to 8 percent slopes
ShC	Sherwood fine sandy loam, 3 to 8 percent slopes
ShD	Sherwood fine sandy loam, 8 to 12 percent slopes
SkD	Sherwood-Pickens association, rolling *
SmD2	Sumter clay, 3 to 12 percent slopes, eroded
SoD	Sumter-Oktibbeha association, rolling *
TeA	Terouge clay, 0 to 1 percent slopes
TeB	Terouge clay, 1 to 3 percent slopes
TkE	Tiak soils, 8 to 20 percent slopes
To	Toine loam

* The delineations are much larger and the composition of these units is more variable than other map units in the county. Mapping has been controlled well enough for the anticipated use of the soils.

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Divided
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

Located object

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Soil survey
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches

Lakes and ponds
- Perennial (water, w)
- Intermittent (int)

Spring

Marsh or swamp

Wet spot

Drainage end or alluvial fan

RELIEF

Escarpments
- Bedrock
- Other

Short steep slope

Prominent peak

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil boundary and symbol (Dx)
- Gravel
- Stoniness
  - Stony
  - Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully

HOWARD COUNTY, ARKANSAS — SHEET NUMBER 1

1

N

1 310 000 FEET

620 000 FEET

R. 30 W.

POLK COUNTY

T. 5 S.

POLK COUNTY

CREEK

FLAT

COSSATOT

RIVER

Pryor Creek

PpB

PkE

SkD

PsB

ShD

ShC

PcD

6 5 4

7 8 9

18 17 16

19 20 21

(Joins sheet 2)

(Joins sheet 5)

610 000 FEET

1 330 000 FEET

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0 1 000 2 000 3 000 4 000 5 000

(2)

N

POLK COUNTY

R. 30 W. | R. 29 W

1 360 000 FEET

620 000 FEET

T. 5 S.

610 000 FEET

1 340 000 FEET

(Joins sheet 1)

(Joins sheet 3)

(Joins sheet 6)

Scale 1:24 000

2 Miles 10 000 Feet

1 5 000

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

1¼ 5 000

Baker Creek

Moore Creek

To

SkD PkE PpB PsB ShC ShD PcD

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

HOWARD COUNTY, ARKANSAS — SHEET NUMBER 3

3

N

1 370 000 FEET

POLK COUNTY

R. 29 W. | R. 28 W.

615 000 FEET

T. 5 S.

(Joins sheet 2)

(Joins sheet 4)

605 000 FEET

(Joins sheet 7)

1 390 000 FEET

2 Miles

10 000 Feet

Scale 1:24 000

NATIONAL FOREST BOUNDARY

SALINE CEMETERY

Midway Church

Minieola

Saline River

Harris Creek

Moore Creek

Millseat Branch

SkD PkE PsB ShD ShC PcD PmC PpB To

N

R. 28 W.

POLK COUNTY

1 420 000 FEET

615 000 FEET

PIKE COUNTY

T. 5 S.

Little Mountain

Round Top

Big Tom Mountain

OUACHITA NATIONAL FOREST

White Oak Creek

Saline River

Clover Branch

Indian Creek

Athens

SECTION CEMETERY

84

605 000 FEET

1 400 000 FEET

(Joins sheet 3)

(Joins sheet 8)

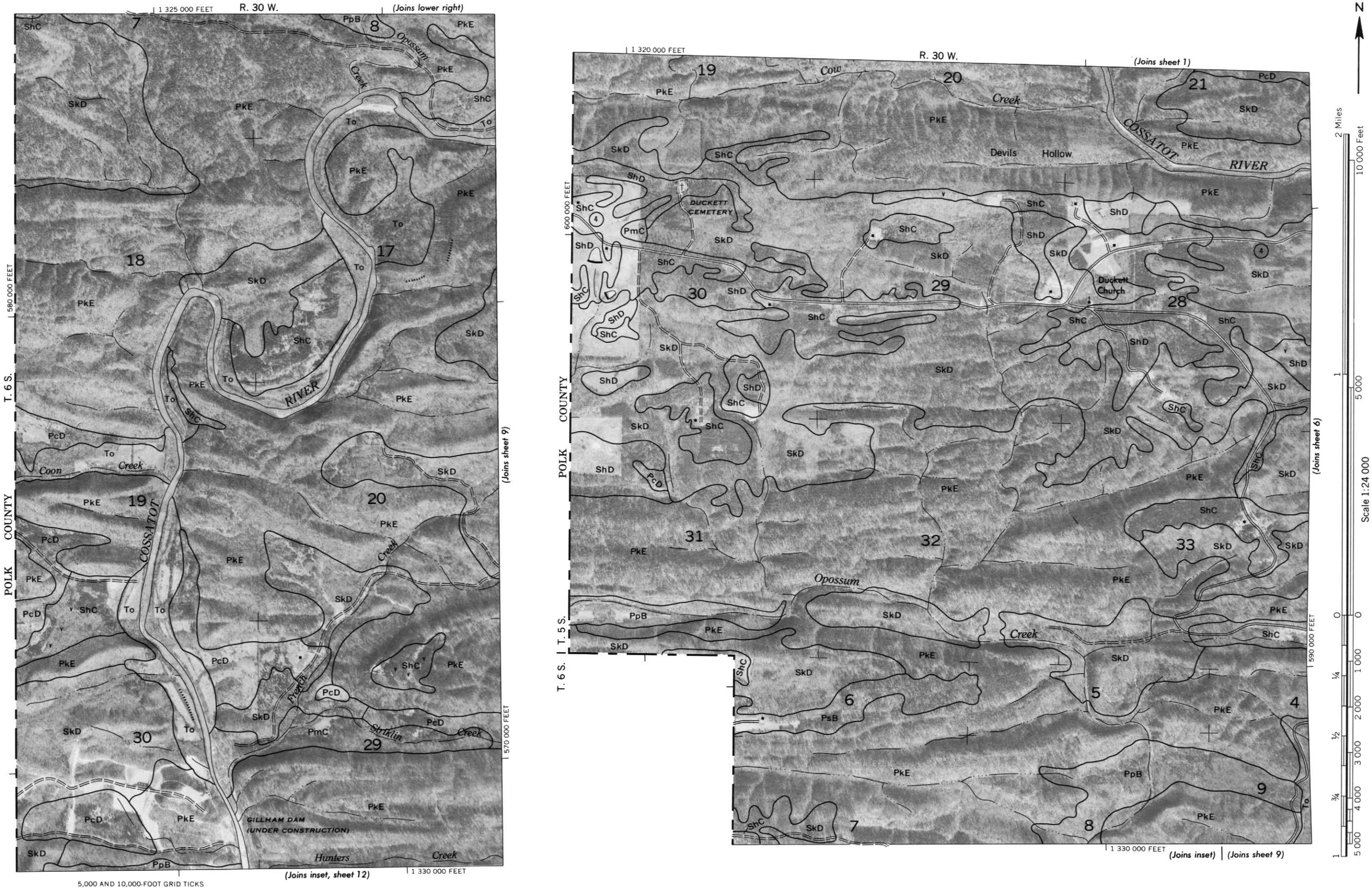
Scale 1:24 000

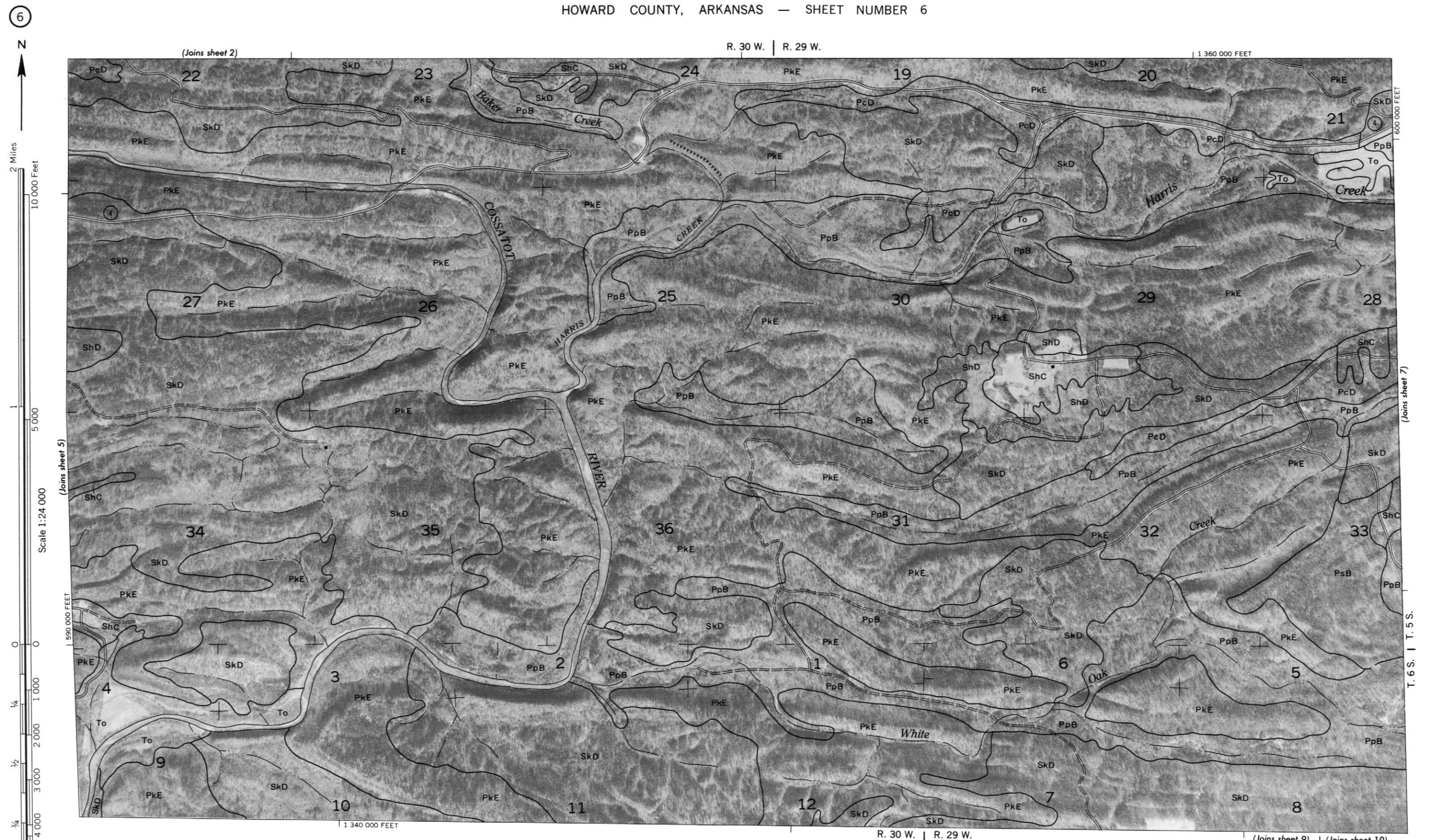
2 Miles 1 0

10 000 Feet 5 000 0

5 000 4 000 3 000 2 000 1 000 0

1 ¾ ½ ¼ 0


1 325 000 FEET
R. 30 W.
(Joins lower right)
1 320 000 FEET
(Joins sheet 1)
600 000 FEET
580 000 FEET
570 000 FEET
590 000 FEET
T. 6 S.
T. 5 S.
POLK COUNTY
(Joins sheet 9)
(Joins sheet 6)
Opossum Creek
Coon Creek
COSSATOT RIVER
Cow Creek
Devils Hollow
Duckett Cemetery
Duckett Church
Gillham Dam (Under Construction)
Hunters Creek
Peach Creek
Strikin Creek
PkE
PkD
ShC
ShD
SkD
PmC
PpB
PsB
To
(Joins inset, sheet 12)
1 330 000 FEET
(Joins inset)
(Joins sheet 9)
5,000 AND 10,000-FOOT GRID TICKS
N
2 Miles
10 000 Feet
5 000
Scale 1:24 000


N
(Joins sheet 2)
R. 30 W. | R. 29 W.
1 360 000 FEET
600 000 FEET
(Joins sheet 7)
(Joins sheet 5)
590 000 FEET
1 340 000 FEET
T. 6 S. | T. 5 S.
R. 30 W. | R. 29 W.
(Joins sheet 9) | (Joins sheet 10)
Baker Creek
COSSATOT RIVER
HARRIS CREEK
Harris Creek
Oak Creek
White
PkE
SkD
PpB
ShC
ShD
PcD
To
PsB
22
23
24
19
20
21
27
26
25
30
29
28
34
35
36
31
32
33
4
3
2
1
6
5
9
10
11
12
7
8
2 Miles
10 000 Feet
1
5 000
Scale 1:24 000
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1

HOWARD COUNTY, ARKANSAS — SHEET NUMBER 7

7

N

1 370 000 FEET

600 000 FEET

R. 29 W. | R. 28 W.

(Joins sheet 3)

(Joins sheet 6)

(Joins sheet 8)

590 000 FEET

T. 6 S. | T. 5 S.

1 390 000 FEET

R. 29 W. | R. 28 W.

(Joins sheet 10) | (Joins 11)

2 Miles

10 000 Feet

Scale 1:24 000

Moore Creek

Harris Creek

Tobe Branch

Oak Creek

White Creek

Camp Creek

Bethel Branch

Amos Br

SALINE RIVER

Umpire

CEDAR HILL CEMETERY

BETHEL CEMETERY


N
Scale 1:24 000
2 Miles
10 000 Feet
5 000
0
1 000
2 000
3 000
4 000
5 000
1/4
1/2
3/4
1
(Joins sheet 4)
(Joins sheet 7)
(Joins sheet 11)
R. 28 W.
R. 27 W.
1 420 000 FEET
595 000 FEET
585 000 FEET
1 400 000 FEET
PIKE COUNTY
T. 5 S.
T. 6 S.
Saline River
Indian Creek
Saline
Amos Branch
Brushy Creek
21
22
23
24
25
26
27
28
33
34
35
36
4
5
3
2
1
8
9
10
11
12
SkD
PpB
PkE
ShC
ShD
PcD
PmC
PsB
SaD
To

HOWARD COUNTY, ARKANSAS — SHEET NUMBER 9

9

N

(Joins sheet 5) | (Joins sheet 6)

1 340 000 FEET

R. 30 W. | R. 29 W.

T. 6 S.

580 000 FEET

(Joins inset, sheet 5)

(Joins sheet 10)

570 000 FEET

(Joins sheet 12)

1 360 000 FEET

Scale 1:24 000

2 Miles 10 000 Feet

1 5 000

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

Galena

COSSATOT RIVER

French Creek

Striklin Creek

Snake Creek

Hunters Creek

N

(Joins sheet 6) | (Joins sheet 7)

R. 29 W. | R. 28 W.

1 390 000 FEET

T. 6 S.

(Joins sheet 11)

(Joins sheet 9)

570 000 FEET

(Joins sheet 13)

1 370 000 FEET

Scale 1:24 000

2 Miles 10 000 Feet 5 000 0 1 000 2 000 3 000 4 000 5 000

1 ¼ ½ ¾ 1

Burg

Mountview Church

DAVIS CEMETERY

Creek

Camp Creek

RIVER

SALINE

Brushy Creek

Little Caney Creek

SkD PsB ShC ShD PcD PkE PpB To

(7) (Joins sheet 8)

1 400 000 FEET

R. 28 W.

580 000 FEET

T. 6 S.

(Joins sheet 10)

(Joins sheet 14)

570 000 FEET

1 420 000 FEET

PIKE COUNTY

Misels Chapel

HARMONY CEMETERY

Long Creek

Brushy Creek

Little Caney Creek

Caney Creek

Holly Creek

Muddy Fork

PpB SALINE RIVER

11

N

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0

¼ 1 000 0

½ 2 000

¾ 3 000

1 4 000

5 000

HOWARD COUNTY, ARKANSAS — SHEET NUMBER 12

N

(Joins sheet 9)

R. 30 W. | R. 29 W.

1 360 000 FEET

PpB Hunters Creek PpB PkE PpB PkE PkE SkD PkE Snake SkD PsB

SkD 33 34 35 36 31 32 T. 6 S.

(Joins inset) SkD ShD SkD SkD PkE ShD PpB Creek

(Joins sheet 13)

SEVIER COUNTY

560 000 FEET

2 Miles 10 000 Feet

1 5 000

0 0

¼ 1 000

½ 2 000

¾ 4 000

1 5 000

Scale 1:24 000

(Joins inset, sheet 5) R. 30 W. 1 330 000 FEET

PpB SkD PkE

POLK COUNTY 31 PpB RIVER 32 T. 6 S.

PpB Carters Creek PkE COSSATOT SkD ShD

(Joins upper left)

563 000 FEET 567 000 FEET

PkE ShD

SEVIER COUNTY 1 325 000 FEET

4,000 AND 5,000-FOOT GRID TICKS

550 000 FEET

1 340 000 FEET

N

1 370 000 FEET

R. 29 W. | R. 28 W.

(Joins sheet 10)

(Joins sheet 12)

T. 6 S.

T. 7 S.

560 000 FEET

550 000 FEET

(Joins sheet 14)

(Joins sheet 16)

1 390 000 FEET

Scale 1:24 000

2 Miles

10 000 Feet

5 000

0

1 000

2 000

3 000

4 000

5 000

1/4

1/2

3/4

1

Snake Creek

Camp Creek

Caney Creek

Bishop Creek

Rock Creek

Flowers Creek

Spring Creek

SEVIER CO

SALINE RIVER

Liberty Hill Church

HUFFMAN CEMETERY

HICKORY GROVE CEMETERY

32 33 34 35 36

31

4 3 2 1

6

9 10 11 12

7

16 15 14 13 18

SkD PkE PsB PpB PmC PcD ShC ShD To

N

Scale 1:24 000

2 Miles 10 000 Feet 5 000

1 0 1 000 2 000 3 000 4 000 5 000

¼ ½ ¾

(Joins sheet 11)

R. 28 W. | R. 27 W.

1 420 000 FEET

560 000 FEET

T. 7 S. | T. 6 S.

PIKE COUNTY

(Joins sheet 13)

(Joins sheet 15)

550 000 FEET

(Joins sheet 17)

1 400 000 FEET

Caney Creek

Spring Creek

Flowers Creek

Holly Creek

Muddy Fork

Trout Branch

Long Hollow Creek

OLD LIBERTY CEMETERY

HENRY CEMETERY

Blue Ridge Lookout Tower

70

4

32 33 34 35 36

5 4 3 2 1 6

8 9 10 11 12 7

17 16 15 14 13 18

ShC ShD PcD PkE SkD PpB PsB SeE SeC

15

N

1 430 000 FEET

560 000 FEET

PIKE COUNTY

R. 27 W.

T. 7 S.

(Joins sheet 14)

1 440 000 FEET

550 000 FEET

PIKE COUNTY

(Joins sheet 18)

Scale 1:24 000

2 Miles

10 000 Feet

5 000

0

1 000

2 000

3 000

4 000

5 000

1

¼

½

¾

1

0

Hilly Creek

West Fallen Branch

Creek

Jacobs Creek

Muddy Fork

369

SkD PpB PsB PcD PmC ShC SeC SeE On

HOWARD COUNTY, ARKANSAS — SHEET NUMBER 16

N

2 Miles 10 000 Feet

1 5 000

Scale 1:24 000

1 5 000 0 0 ¼ 1 000 ½ 2 000 ¾ 3 000 1 4 000 5 000

R. 29 W. | R. 28 W.

(Joins sheet 13)

1 390 000 FEET

1 540 000 FEET

T. 7 S.

530 000 FEET

1 370 000 FEET

(Joins sheet 17)

(Joins sheet 19)

DIERKS DAM (UNDER CONSTRUCTION)

SALINE — SEVIER COUNTY — RIVER

Bluff Creek

Rock Creek

Holly Creek

DE QUEEN AND EASTERN

Dierks

Grandview Church

70

4

15 16 14 13 18 21 22 23 24 19 28 27 26 25 30 33 34 35 36 31

PkE SkD PpB SeE SeC SaD SaC BIC BIB On Ad SoD SfC LuE

17

N

1 400 000 FEET

(Joins sheet 14)

R. 28 W. | R. 27 W.

T. 7 S.

540 000 FEET

530 000 FEET

1 410 000 FEET

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 20)

Scale 1:24 000

2 Miles

10 000 Feet

5 000

0

1 000

2 000

3 000

4 000

5 000

1

½

¼

0

¾

1

Dierks

Greens Chapel

Dierks Lake

Long Hollow Creek

Trout Branch

Thompson Branch

Little Holly Creek

Holly Creek

On Creek

GRAVEL PIT

QUARRY

DE QUEEN AND EASTERN

70

4

PkE PpB SkD SeE SeC SaC SaD BIC BIB RuC SfC SoD On AnC

N

(Joins sheet 15) R. 27 W. 1 440 000 FEET

1 540 000 FEET

T. 7 S.

PIKE COUNTY

(Joins sheet 17)

1 530 000 FEET

1 420 000 FEET (Joins sheet 21)

2 Miles 10 000 Feet

Scale 1:24 000

1 5 000 4 000 3 000 2 000 1 000 0

1 5 000 ¾ ½ ¼ 0

16 15 14 13 17 18 19 20 21 22 23 24 30 29 28 27 26 25 31 32 33 34 35 36

PpB SkD SeC SeE On BlC SaD SaC RuB RuC BlB SoD SfC Ad PsB SeE

Blackwood Cemetery

Kesterson Cemetery

Polk Cemetery

Polk Church

Wildcat Bluff

Muddy Fork

Panther Creek

Fallen Creek

Jacobs Creek

Muddy Fork

Red Branch

Briar Creek

Muddy Fork

To Creek

Bluff Luc

De Queen and Eastern

369

N

1 370 000 FEET

R. 29 W. | R. 28 W. *(Joins sheet 16)*

525 000 FEET

T. 8 S.

Atwood

POTTS CEMETERY

ALLEN CEMETERY

Bethany

Hollu Creek

EASTERN AND DE QUEEN

SALINE RIVER

SEVIER COUNTY

Messer Ck

(Joins sheet 20)

515 000 FEET

1 380 000 FEET

(Joins sheet 22)

2 Miles

10 000 Feet

5 000

Scale 1:24 000

N

(16) (Joins sheet 17)

1 410 000 FEET

R. 28 W. | R. 27 W.

Little Holly Creek

Fellowship Church

WYNN CEMETERY

Oregon Branch

Messer Creek

Bishop Creek

T. 8 S.

(Joins sheet 19)

(Joins sheet 27)

1 390 000 FEET

(Joins sheet 23)

510 000 FEET

520 000 FEET

2 Miles 10 000 Feet 5 000

Scale 1:24 000

0 0

¼ 1 000

½ 2 000

¾ 3 000

4 000

5 000

1 420 000 FEET

R. 27 W.

(Joins sheet 18)

N

T. 8 S.

520 000 FEET

(Joins sheet 20)

Hagler

DE QUEEN

Red Br.

Creek

Briar

Creek

AND

EASTERN

Creek

Dawson

Creek

Bluff

Creek

Briar

Creek

MISSOURI PACIFIC

DAWSON CEMETERY

NEW HOME CEMETERY

Reed Church

Perkins

BRIAR PLANT GYPSUM QUARRY

GYPSUM QUARRY

GYPSUM QUARRY

GYPSUM QUARRY

AnC SaD BIB BIC SaC SoD SfC LuE SeE TkE RuC CaC SeC Ad On

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

369 26

1 440 000 FEET

(Joins sheet 24)

PIKE COUNTY

510 000 FEET

2 Miles

10 000 Feet

Scale 1:24 000

1 5 000 0

¼ 1 000

½ 2 000

¾ 4 000

1 5 000

N

2 Miles

10 000 Feet

Scale 1:24 000

1 380 000 FEET

R. 29 W. | R. 28 W.

(Joins sheet 19)

505 000 FEET

(Joins sheet 23)

T. 9 S. | T. 8 S.

495 000 FEET

1 370 000 FEET

(Joins sheet 25)

Oak Hill Church

Mount Carmel Church

Beech Creek

Messer

Messer Creek

SALINE

SEVIER

RIVER

COUNTY

Sand Creek

22 23 24 19

27 26 25 30

34 35 36 31

3 2 1 6

Ad BIB BIC SeC SaC SaD On RuC RuB LuE SoD


1 390 000 FEET
505 000 FEET
R. 28 W.
R. 27 W.
T. 9 S.
T. 8 S.
(Joins sheet 20)
(Joins sheet 22)
(Joins sheet 24)
(Joins sheet 26)
1 410 000 FEET
1 495 000 FEET
N
2 Miles
10 000 Feet
5 000
0
Scale 1:24 000
1 000
2 000
3 000
4 000
5 000
Center Point
Wesley Chapel
Center Point Church
SUNSHINE CEMETERY
G.P.
Beech Creek
Bayou Blue
Coleman Creek
Big Sand Creek
20
21
22
23
24
19
29
28
27
26
25
30
32
33
34
35
36
31
5
4
3
2
1
6
BIB
BIC
MIC
SaC
SaD
SeB
SeC
SeE
LuE
RuC
RuB
SoD
On
SfB
GrC
Ad

(24)

N

Scale 1:24 000

2 Miles 10 000 Feet

1 5 000

0 1 000 2 000 3 000 4 000 5 000

¼ ½ ¾

(Joins sheet 21) R. 27 W. 1 440 000 FEET

(Joins sheet 23)

1 490 000 FEET

1 420 000 FEET (Joins sheet 27)

500 000 FEET

T. 8 S. PIKE COUNTY

T. 9 S. HEMPSTEAD COUNTY

Corinth

MOUNT PLEASANT CEMETERY

MISSOURI

PACIFIC

Mine

Pea Ridge

Temperanceville

Coleman Creek

Dodson Creek

West Fork

Bryant Branch

Pump Springs Branch

water

20 21 22 23 24

19 30 29 28 27 26 25

31 32 33 34 35 36

6 5 4 3 2 1

TkE SeE SeC SaC SaD GrC RuC RuB BIB MIC MID On SeB AnC SfC

25

N

R. 29 W. | R. 28 W.

1 380 000 FEET

(Joins sheet 28)

T. 10 S.

450 000 FEET

SfB, BIB, Ad, StC, On, To, BlB, Sulphur Creek, Starch Creek, Shonia Creek, SALINE COUNTY, SEVIER COUNTY, SALINE RIVER, 13, 14, 18, 19, 24

(Joins sheet 31)

440 000 FEET

27, 30

1 385 000 FEET

5,000 AND 10,000-FOOT GRID TICKS

1 375 000 FEET

R. 29 W. | R. 28 W.

(Joins sheet 22)

490 000 FEET

T. 9 S.

Messer Creek, SEVIER COUNTY, SALINE COUNTY, Sand Creek, Brushy Creek, Prairie Creek, SALINE RIVER, LuE, SaC, SaD, On, To, MT CARMEN CEMETERY, BlB, SeE, SeC, COULTER CEMETERY, RuB, RuC, GrC, SeB, Ad, MID, LuE, 7, 11, 12, 13, 14, 18, 19, 23, 24, 25, 26

(Joins sheet 26)

480 000 FEET

(Joins sheet 28)

1 385 000 FEET

N

2 Miles

10 000 Feet

5 000

Scale 1:24 000

N

(Joins sheet 23)

1 410 000 FEET

R. 28 W. | R. 27 W.

T. 9 S.

1 485 000 FEET

(Joins sheet 27)

(Joins sheet 25)

1 475 000 FEET

1 390 000 FEET

(Joins sheet 29)

Scale 1:24 000

2 Miles 10 000 Feet

1 5 000 0 5 000

¼ 1 000 0 1 000

½ 2 000 3 000

¾ 4 000 5 000

Brushy Creek

Blue Bayou

Rock Creek

Dillard Creek

Center Church

GRAVES CEMETERY

Blue Bayou

County Line Church

SaD SeC SeE BlB SaC RuB RuC SaB SeB AnB AnC On TkE CaC LuE MIC SfC

1 420 000 FEET

R. 27 W.

(Joins sheet 24)

N

1 485 000 FEET

T. 9 S.

(Joins sheet 26)

Pleasant Valley Church

Pump Springs Branch

Mine Creek

West Fork Coleman Creek

Pittard Creek

To Sorrells Branch

Missouri Pacific Mine Creek

NASHVILLE
(county seat)

1 475 000 FEET

1 440 000 FEET

(Joins sheet 30)

HEMPSTEAD COUNTY

2 Miles
10 000 Feet
1
5 000

Scale 1:24 000

1 5 000 0 1 000 ¼ 2 000 ½ 3 000 ¾ 4 000 1 5 000

N

2 Miles 10 000 Feet

1 5 000

Scale 1:24 000

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

R. 28 W. | R. 27 W.

(Joins sheet 33)

1 410 000 FEET

410 000 FEET

400 000 FEET

T. 11 S.

(Joins sheet 35)

MILLWOOD RESERVOIR

CHALK QUARRY

G N AND A

SEVIER COUNTY

LITTLE RIVER COUNTY

HEMPSTEAD COUNTY

5,000 AND 10,000-FOOT GRID TICKS

1 405 000 FEET

R. 29 W. | R. 28 W.

(Joins sheet 25)

1 385 000 FEET

470 000 FEET

460 000 FEET

T. 10 S.

Prairie Cr.

Sulphur Rock Creek

Slough

Starch Creek

SALINE RIVER

SEVIER COUNTY

(Joins sheet 29)

1 375 000 FEET

(Joins inset, sheet 25)

HOWARD COUNTY, ARKANSAS — SHEET NUMBER 29

29

N

1 390 000 FEET

470 000 FEET

R. 28 W. | R. 27 W.

(Joins sheet 26)

T. 10 S. | T. 9 S.

(Joins sheet 28)

(Joins sheet 30)

460 000 FEET

1 410 000 FEET

(Joins sheet 31)

Rock Creek

Starch Creek

BIB Creek

Bayou Lefever

Blue Creek

Bluff Springs Church

HICKORY GROVE CEMETERY

New Mt Zion Church

2 Miles

10 000 Feet

5 000

0

Scale 1:24 000

1 1/4 1/2 3/4 1

5 000 4 000 3 000 2 000 1 000 0

N

(Joins sheet 27)

R. 27 W.

1 440 000 FEET

NASHVILLE
(county seat)

MISSOURI PACIFIC

ASHDOWN

Coleman

Creek

SANITARY LAGOON

Wakefield Church

Unity Church

Midway

Dillard Creek

Lefever Creek

Sandy Branch

Mine Creek

GRAYSONIA NASHVILLE

T. 9 S.

T. 10 S.

HEMPSTEAD COUNTY

1 455 000 FEET

1 420 000 FEET

(Joins sheet 29)

(Joins sheet 32)

Scale 1:24 000

2 Miles 1 0 10 000 Feet

1 5 000 0 1 000 2 000 3 000 4 000 5 000

HOWARD COUNTY, ARKANSAS — SHEET NUMBER 31

31

N

1 390 000 FEET

450 000 FEET

R. 28 W. | R. 27 W.

(Joins sheet 29)

T. 10 S.

(Joins inset, sheet 25)

(Joins sheet 32)

440 000 FEET

1 410 000 FEET

(Joins sheet 33)

Mineral Springs

Shiloh Church

Shiloh

Bayou

Blue

Ingram Creek

SEVIER CO

SALINE RIVER

SEVIER COUNTY

Scale 1:24 000

2 Miles

10 000 Feet

5 000

N

(Joins sheet 30)

R. 27 W.

1 440 000 FEET

450 000 FEET

T. 10 S.

Mineral Springs

GRAVEL PIT

Saint Johns Church

Bethel Church

Liberty Church

Buck Range

Drillard

Ashdown

Nashville

Grayson

Creek

Mine

Brushy

HEMPSTEAD COUNTY

1 440 000 FEET

(Joins sheet 31)

(Joins sheet 34)

1 420 000 FEET

Scale 1:24 000

2 Miles 10 000 Feet

1 5 000

¾ 4 000

½ 3 000

¼ 2 000

0 1 000 0

1 390 000 FEET

430 000 FEET

(Joins sheet 31) R. 28 W. | R. 27 W.

T. 11 S. | T. 10 S.

N

Scale 1:24 000

2 Miles 1 0

10 000 Feet 5 000 0

1 420 000 FEET

1 000 0

¼ 2 000

½ 3 000

¾ 4 000

1 5 000

(Joins sheet 34)

(Joins inset, sheet 28)

1 410 000 FEET

SALINE RIVER

SEVIER COUNTY

Negro Branch

Schaal

Tabernacle Church

Schaal Church

Bright Star

Mine Creek

Le

Hosey Branch

Schaal Branch

Ingram Creek

MINE CREEK

MILLWOOD RESERVOIR

MILLWOOD RESERVOIR

32 33 34 35 36 31

4 3 2 1 6

9 10 11 12 7

15 14 13 18

To On SfB SfC AnB AnC MIC RuB RuC TkE Ad BIB BIC

N

2 Miles

10 000 Feet

5 000

4 000

Scale 1:24 000

3 000

2 000

1 000

0

0

¼

½

¾

1

5 000

(Joins sheet 32)

R. 27 W.

1 440 000 FEET

(Joins sheet 33)

420 000 FEET

T. 11 S.

T. 10 S.

430 000 FEET

HEMPSTEAD COUNTY

(Joins sheet 35)

1 420 000 FEET

Mine Creek

CROFTON CEMETERY

BUCK RANGE CEMETERY

Tollette

Blackland Church

Schooley

Corinth Church

Wilson Pond

Baber Creek

Grahm Creek

Plum Creek

MINE CREEK

ASHDOWN-GRAYSONIA-NASHVILLE RD

31 32 33 34 35 36

6 5 4 3 2 1

7 8 9 10 11 12

18 17 16 15 14 13

TeB DeD3 SmD2 OkD2 OkC2 MuB Le Ka Ma AnC SaC AnB RuC TeA

1 420 000 FEET

R. 27 W.

(Joins sheet 34)

1 410 000 FEET

T. 11 S.

(Joins inset, sheet 28)

MILLWOOD RESERVOIR

Plum Creek

NASHVILLE AND TEXARKANA

GRAYSONIA NASHVILLE

HIGH HILL CEMETERY

Okay

Saratoga

HEMPSTEAD COUNTY

1 440 000 FEET

1 400 000 FEET

N

2 Miles

10 000 Feet

Scale 1:24 000